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Dr. GEORGE WILLIAM STAEMPFLI

THE

NATURAL HISTORY

OF

BRITISH FISHES,

INCLUDING

SCIENTIFIC AND GENERAL DESCRIPTIONS

OF THE

MOST INTERESTING SPECIES,

AND AN

EXTENSIVE SELECTION

OF

ACCURATELY FINISHED COLOURED PLATES.

TAKEN ENTIRELY FROM

ORIGINAL DRAWINGS,

PURPOSELY MADE FROM THE SPECIMENS IN A RECENT STATE,
AND FOR THE MOST PART WHILST LIVING.

VOL. II.

BY E. DONOVAN, F.L.S.
AUTHOR OF THE NATURAL HISTORIES OF BRITISH BIRDS,
INSECTS, SHELLS, &c.

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1803.

BEARDED LOCHE.

London, Pub.d as the Act directs by E. Donovan, F.R.S. C. Rivington, Feb.y 1.1803.

PLATE 66

PLATE XXII.

COBITIS BARBATULA.

BEARDED LOCHE.

GENERIC CHARACTER.

Head small, oblong, naked: eyes in the upper part of the head, and nape flat: branchiostegous membrane with from four to six rays; covers of one piece and close beneath. Body covered with a mucous; and small, thin, and very deciduous scales: variously banded and spotted; and nearly of an equal thickness throughout. Back straight, with a single fin: lateral line scarcely conspicuous: vent near the tail: the latter rounded.

SPECIFIC CHARACTER

AND

SYNONYMS.

Cirri six: head unarmed and compressed.

COBITIS BARBATULA cirris 6, capite inermi compresso. *Linn.*—*Gmel. Syst. Nat. T.* 1. *p.* 3. *p.* 1348. *sp.* 2.

Enchelyopus nobilis cinereus, &c. *Klein miss. pisc.* 4. *p.* 59. *n.* 3. *t.* 15. *f.* 4.

Cobitis barbatula, *Rondel. Aldr. Johnst*, &c.

Cobitis fluviatilis, *Raj. pisc. p.* 124.

Fundulus, *Mars. Danub.* 4. *p.* 74. *t.* 25. *f.* 1.

Bearded Loche, *Penn. Brit. Zool. T.* 1. *p.* 3. *p.* 1348. *sp.* 2.

PLATE XXII.

A native of Europe and Asia; and most frequent in fresh water streams and lakes in mountainous countries. From its habit of lurking at the bottom of the water, on the gravel, it has been called the groundling; but the latter name is now given to the Spiny Loche, a fish distinguished from the present by having a forked spine under each eye, and is that species of Cobitis which Gmelin calls Tænia.

This is a fertile creature: it spawns in the month of March and April, and grows to the length of three or four inches, but seldom larger. It feeds on aquatic insects, and, we are told by Mr. Pennant, is frequent in the stream near Amesbury, in Wiltshire, where the sportsmen, through frolic, swallow it down alive in a glass of wine.

The Loche is found in far greater abundance in France, and other parts of Europe, than in England; and are in such high estimation for their exquisite delicacy and flavour, that they are often transported with considerable trouble from the rivers they naturally inhabit, to waters more contiguous to the estates of the great. This is usually performed in Winter, and it is necessary to keep the water in continual agitation the whole way, as the fish would otherwise die. Frederic the First, King of Sweden, had them brought in this manner from Germany into his country, where they have been since naturalized; a circumstance that leads us to conclude they were either scarce, or not originally natives of that country.

In the dorsal fin of our specimen, are nine rays; in the pectoral, eleven; ventral, eight; anal, seven; and in the tail, nineteen.

SEWEN.

London: Pub.d as the Act directs by E. Donovan, & F.& C. & J. Rivington, May 1.st 1806.

PLATE XCI.

SALMO CAMBRICUS.

SEWEN.

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large: lips small: tongue white, cartilaginous, and moveable: teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays; gill-cover of three plates. Body long, covered with rounded and very finely striated scales: back convex: lateral line straight, and nearest to the back: posterior dorsal fin fleshy without rays: ventral fin of many rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Head short and sloping: lower jaw longest: body silvery, above greyish, with dusky-purplish cruciform spots: tail slightly furcated.

SALMO CAMBRICUS: capite declivi, maxilla inferiore longiore, corpore argenteo, supra cinerascente maculis cruciformibus fusco-violaceis, cauda sub-furcata.

SEWEN or SEWIN. *Donov. Tour. South Wales and Monmouthshire. v. 1. p. 237.*

GREY. *Penn. Brit. Zool. v. 3. p. 295. n. 144.*

SALMO SCHIEFFER-MULLERI. *Bloch. Ichth. Deutsch?*

PLATE XCI.

Mr. Pennant is uncertain whether the grey (which he believes to be the Sewen of South Wales) is not a mere variety of the Salmon; but on the authority of Mr. Ray he describes them separately. Ray tells us it is a strong fish, that it does not ascend the fresh waters till Auguſt, when it rushes up with great violence; that it is rarely taken, and not much known. "The inhabitants of South Wales," adds Mr. Pennant, "seem extremely well assured, that it is a distinct species from the Salmon. They appear in the Esk in Cumberland, from July to September, and are then in spawn. The lower jaw grows hooked when they are out of season." "The head is larger in proportion than that of the Salmon. In the jaws are four rows of teeth, and on the tongue are eight teeth. The back and sides, above the lateral line, of a deep grey, spotted with a number of purplish spots. The belly silvery: the tail even at the end." "This we believe to be the Sewin, or Shewin of *South Wales*. The description above, was communicated to us by Dr. Roberts, of Herefordshire." *Penn. Brit. Zool.*

The Sewen differs from the common Salmon, (Salmo salar) in various particulars that will not fail to strike the eye of the judicious naturalist on comparing the two fishes. The general contour of the whole fish is slightly dissimilar; the head is shorter and more sloping; while the lower jaw extends rather beyond the upper one, the precise contrary of which is observable in the common Salmon. The back is of a pale greyish colour, glossed with blue, and by no means so dark as in the common Salmon; this greyish colour prevails under the scales, from the back to the lateral line, beneath which, the whole fish is of the brightest silver. Both on the back and sides, above and below the lateral line, the body is marked with dusky purple spots of a roundish shape, which, on close in-

spection, appear to be somewhat cruciform: the lateral line is straight, and placed rather lower than in the generality of fishes. The tail is slightly forked, but not semilunated as in the common Salmon. When the flesh is cut it is of a pale red. In point of size, the Sewen rarely exceeds twelve or fifteen inches, weighing from one to two pounds.

This fish, which is almost peculiar to Wales, and is found in the greatest abundance in the southern parts, is of the migratory kind, appearing on the sea coasts, and in the rivers of that country during the summer months, from May to September, and then returning to the sea. We have met with this fish both in South and North Wales, but in the greatest plenty on the coasts of the two maritime counties, Glamorganshire and Carmarthenshire: it is an excellent and delicate fish for the table, and is held in high repute by the inhabitants of Wales.—The above passages are repeated from our observations on this curious fish, in a "Descriptive Sketch of the Cambrian Principality" lately submitted to the public. To this we can only add what appears to us a sufficient character after the Linnæan manner, by which the species may be discriminated; and to enumerate some few slight particulars, which, in a work designed for general information, were purposely omitted. The first dorsal fin usually contains eleven rays, the second is fleshy and destitute of rays: in the pectoral fin are fourteen rays: ventral nine rays: anal ten rays: and in the tail twenty-eight, including the short lateral rays at the base.

ALPINE CHARR.

London Published the 1st March by E. Donovan & F. & C. Rivington, Sept. 1st 1804.

PLATE LXI.

SALMO ALPINUS.

CHARR.

ALPINE SALMON.

*** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large: lips small: tongue white, cartilaginous, and moveable: teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays; cover of three plates. Body long, covered with rounded and very finely striated scales: back convex: lateral line straight, and nearest to the back: posterior dorsal fin fleshy without rays: ventral fin of many rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Back black, sides blue; belly fulvous.

SALMO ALPINUS: dorso nigro, lateribus cæruleis, ventre fulvo. *Linn. Fn. Suec.* 349.—*Gmel.* 1370. *sp.* 8.

Salmo vix pedalis pinnis ventris rubris, maxilla inferiore paulo longiore. *Arted. Gen.* 13. *syn.* 25. *sp.* 52.

CHARR. *Pen. Brit. Zool.* 3. *p.* 265.

PLATE LXI.

The lake Winander Mere, in the county of Westmoreland, has more than once afforded us specimens of this rare and very local fish, Salmo Alpinus, in the highest state of perfection, in the winter season: at which time they are in full spawn. The fishermen on this lake only take them at this season of the year, when they appear in plenty near the shores of this extensive water. The potted Charr of Westmoreland is esteemed an article of luxury for the table. When dressed in the usual manner like trout this fish is also excellent.

The individual Charr delineated, measures eleven inches and a half from the point of the jaw to the extremity of the tail. In the first dorsal fin, there are eleven rays: the pectoral fin contained sixteen rays: ventral eleven: anal ten: tail twenty-four. Its colours are represented from the fish recently taken. Among several specimens we examined, a material difference prevailed in the exact tints of the colour. In one the gills were faintly speckled with darker colour than in the present; and the belly of another inclined more to silver. All these, however, we have no doubt of being the gilt Charr of Pennant.

Great confusion prevails among the synonyms of Salmo Alpinus, and the other analogous species *Salvelinus*, *Salmarinus*, and the ambiguous *Carpio* of Artedi. The writers of our own country have by no means succeeded in unravelling the perplexity, which induces us to reject with caution much that has been said concerning them. We shall hereafter treat of Salmo Salvelinus, as a British fish, when this interesting subject, the natural history of the Charrs, will be considered with more attention.

SALVELIAN CHARR.

London, Pub.d as the Act directs by E.Donovan & F.C.& J.Rivington, Oct.1.1807.

PLATE CXII.

SALMO SALVELINUS.

SALVELIAN CHARR.

**** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large: lips small: tongue white, cartilaginous, and moveable: teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays; cover of three plates. Body long, covered with rounded and very finely striated scales: back convex: lateral line straight, and nearest to the back: posterior dorsal fin fleshy without rays: ventral fin of many rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

First ray of the dorsal and anal fin white.

SALMO SALVELINUS: radio primo in pinna ventrali analique albo. *Bloch. Fisch. Deutschl.* 3. *p.* 149. *n.* 9. *t.* 99.

SCHWARZREUTERL. *Schrank. Schr. der berl. Naturf. Fr.* 1. *p.* 380.

PLATE CXII.

This is the Torgoch or "*red belly*" of the Welsh, a fish at present confined to the waters of the Llyn Quellyn, one of the alpine lakes, situated in the deep valley on the west side of Snowden. The Torgoch inhabited the Llanberris lake on the opposite side of the mountain till within the last twenty years, since which time they have entirely disappeared:—it is believed that the noxious waters of a neighbouring copper-mine flowing into the lake has destroyed the brood, as those fish inhabit only the purest waters.

Llyn Quellyn is a vast lake, of unknown depth, sheltered on one side by an abrupt mountain, which rises immediately out of the water, and in the deep recesses at the base of which the Torgoch is supposed to pass the milder seasons of the year in perfect security. Those fish approach the shallower parts of the lake in winter, about the middle of December, appearing in small troops at a short distance from the shores, and are at this season taken in some plenty by a poor cottager, who resides in the vicinity of the lake, and derives a small annual profit from the fishery; this delicious fish being in much request for the tables of the neighbouring gentry.

This fish differs from the Charr of Wynandermere, in Westmoreland, and can be no other in our idea than the true Salmo Salvelinus. The Torgoch spawns later in the season, and never increases to a size much larger than that represented in our plate, which is scarcely half the dimensions of the other. The outline is more slender, and the colours in point of splendour far superior. The lower jaw in the Torgoch, contrary to the Gmelinian character of *Salvelinus*, projects rather beyond the upper one, and in this respect accords with *Alpinus:* it must, however, be recollected, that the elongation of the lower jaw in the Salmo tribe is

not always to be regarded as a specific distinction, these fishes varying at different seasons of the year in this particular considerably. We need only adduce in proof of this the remarkable elongated appearance which the lower jaw of the common Salmon has when it goes out of season; and also of the trout when it attains a large size, in which the same circumstance is observable. From the general habit of the Torgoch we conclude upon the whole it must be the Salmo Salvelinus.

This fish is of an elegant and somewhat slender shape, the head long and rather pointed, and its colours splendid beyond all example among the indigenous fishes of this country. Nothing can exceed the fervid aspect of its colours when first taken; the scarlet of the belly may be truly said to emulate the glowing redness of the fiery element. The upper part of the head and back is of a deep purplish blue, blending into silvery in approaching the lateral line, beneath which the sides are tinged with yellow, passing into orange, and the orange into fine scarlet as it descends towards the belly; the whole of the back and sides are spotted in a most beautiful manner with fine red; the lower fins are also red, except the first ray of the ventral and anal fin, which are white. Upon opening the males we found the roe white; the eggs of the female were of the finest orange colour, and as large as peas, from which, when we consider the small size of the fish, it will be concluded that they are by no means a prolific species. The flesh is excellent, and of a deep red colour. In the first dorsal fin of the specimen represented we counted eleven rays: in the pectoral fin thirteen: in the ventral nine: anal eleven: and caudal twenty-four.

SMELT.

London Pub.d as the Act directs by L. Donovan & F.R.C. Rivington, Sept.r 1, 1803.

PLATE XLVIII.

SALMO EPERLANUS.

SMELT.

* *PISCES ADOMINALES.*

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large: lips small: tongue white, cartilaginous, and moveable: teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays; cover of three plates. Body long, covered with rounded and very finely striated scales: back convex: lateral line straight, and nearest to the back: posterior dorsal fin fleshy without rays: ventral fin of many rays.

SPECIFIC CHARACTER.

Lower jaw longest: seventeen rays in the anal fin.

SALMO EPERLANUS. maxilla inferiore longiore, pinna ani radiis 17. *Bloch. Fisch. Deutscht.*

SALMO EPERLANUS: capite diaphano, radiis pinnæ ani 17. *Fn. Suec.* 350.—*Art. gen.* 10. *syn.* 21. *spec.* 45.—*Gron. Mus.* 1. *p.* 18. *n.* 49.—*Gmel. Syst. Nat.* 1375. *sp.* 13.

Trutta edentula tota argentea, semi-diaphana, &c. *Klein miss. pisc.* 5. *p.* 20. *t.* 4. *f.* 3, 4.

Eperlanus fluviatilis. *Gesn. Thierb. p.* 189.

PLATE XLVIII.

If we may assent to the very probable conjectures of Mr. Pennant, Dr. Bloch and other Ichthyologists, the Smelt is to be considered as a species exclusively confined to the North of Europe. These authors say that it appears in vast shoals in the North Seas, and in the Baltic, but that it never enters the Mediterranean Sea, or is seen further to the southward in its periodical migrations from the northern regions.

The Smelt is found in the seas surrounding our own island, at all seasons of the year. Towards the close of Autumn, they commonly ascend from the sea up those rivers which they frequent, in order to deposit their spawn, and continue in those places till March or April, when having finally accomplished the purpose of their visit, they return again to the sea. This however ought only be understood as the time of their appearance, and emigration in certain rivers, for in this respect the Smelt is extremely irregular; remaining in some five or six months, and in others scarcely so many weeks. The principal fishery for the Smelt commences about March in the temperate parts of Europe.

Dr. Bloch makes two species of the Common Smelt, one of which he retains under the name of Eperlanus, the other he calls Eperlano-marinus. Perhaps there may be, notwithstanding, more propriety in believing with Gmelin, that the Eperlanus, and Der Stint of Bloch is rather a variety than a species distinct from the larger kind. The length of the small sort is from two to three inches; the other most commonly exceeds four inches in length, and sometimes measures six, and even seven, or eight inches. Mr. Pennant speaks of one, the largest he had ever heard of, that was thirteen inches in length, and weighed half a pound. We have seen Smelts of a very large size

taken in the River Thames, though certainly none so considerable in this respect as that recorded by Mr. Pennant. The Smelts mentioned in Narborough's Voyage, that are said to be taken in the Straits of Magellan, some of which measured twenty inches in length, and eight in circumference, were most likely not of this species.

The smell of this fish has an highly odoriferous fragrance peculiar to itself; which has been compared by some to that of cucumbers recently gathered from the garden, and by others it is thought to resemble rather that of violets. Yet this idea does not prevail universally, for there are many persons to whom the fragance arising either from cucumbers or violets are extremely grateful who are disgusted with that of Smelts. Linnæus tells us there is found in the Baltic Sea two varieties of the Smelt, one of which he calls Nors, and speaks of its having a very fœtid smell, which in the early Spring, when the peasants come to buy it, fills all the streets of Upsal with the smell: adding, that at this season of the year, agues prevail there. Bloch has been erroneously misled into the belief that the streets of London are sometimes affected by the stench of Smelts in the same manner.

In the first dorsal fin of the Smelt delineated in the Plate, we counted eleven rays: in the pectoral fin twelve rays: ventral eight: anal fourteen: caudal twenty-one.

GRAYLING.

London, Pubd. by the Proprietors, by R. Ackermann, 101 Strand, March 1st 1808.

PLATE 71

PLATE LXXXVIII.

SALMO THYMALLUS.

GRAYLING.

*** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large: lips small: tongue white, cartilaginous, and moveable: teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays; cover of three plates. Body long, covered with rounded and very finely striated scales: back convex: lateral line straight, and nearest to the back: posterior dorsal fin fleshy without rays: ventral fin of many rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Upper jaw rather longest: first dorsal fin with about twenty-three rays, large, and varied with violaceous and red: body silvery, with cinereous lines.

SALMO THYMALLUS: maxilla superiore longiore, pinna dorsali prima radiis sub 23. magna violaceo-rubroque variegata corpore argenteo cinereo lineatis.

PLATE LXXXVIII.

Salmo Thymallus: maxilla superiore, longiore, pinna dorsi radiis 23. *Müll. Zool. Dan. p.* 49. *n.* 416.—*Gmel. Linn. Syst. Nat. T.* 3. *p.* 1379. *sp.* 17.

Coregonus maxilla superiore longiore, pinna dorsi ossiculorum 23. *Art. Gen.* 10. *Syn.* 20. *spec.* 41.—*Kram. el. p.* 390. *n.* 2.

Salmo pinna dorsi radiis 23. *Bloch Fisch. Deutchl.* 1. *p.* 158. *n.* 4. *t.* 24.

Thynnus. *Rondel. pisc.* 2. *p.* 187, *&c.*

Trutta edentula, labiis pro dentibus limæ instar exasperatis, &c. *Klein miss. pisc.* 5. *p.* 21. *n.* 15. *t.* 4. *f.* 5.

Thymallus. *Will. ichth. p.* 88. *t. n.* 8. *Gesn. aq.* 979.—*Aldr. pisc. p.* 593.

Grayling.—*Ray.*—*Penn. Brit. Zool. V.* 3. *p.* 311. *n.* 150.

This is a migratory fish, passing the winter season in the open sea, and the summer in the fresh waters; early in the spring they ascend the rivers, where they remain till autumn, and then return to their former element. The haunts of this fish in summer are the clear, cold, and rapid streams of Alpine regions, and in such situations, are found in various countries of Europe; and in Siberia. Its food consists principally of Crabs, testaceous animals, worms, insects, and the fry and eggs of other fishes, especially those of the Trout and the Salmon, both which commonly abound in the streams inhabited by the Grayling. The Swedish fishermen are so well assured of its partiality for the eggs of the Salmon, that at the spawning season, whenever the Graylings make their appearance, it is a natural conclusion the Salmon are not far distant. It is generally understood

that the Grayling is not an inhabitant of Norway, as Pontopiddan does not mention it in his Natural History of that country. On the contrary, the Grayling is no where more abundant than in Lapland, where the flesh is eaten in common by the peasants, and a substitute for rennet is obtained by pressure from its entrails, with which they convert the milk of their rein deer into cheese.

The flesh of the Grayling appears to be in very general estimation for its superior delicacy and flavour. Gesner affirms, that in Switzerland it is accounted the choicest of all fish. It is taken in some of the Italian rivers, and in France; in the last of which, the Loire, is celebrated for producing it in great perfection. Bloch tells us it is found in Silesia, in the mountains of Geants: in Prussia, in the Curisch-Have; and in Pomerania, in the Sclave, not far from the Baltic. In some countries the Grayling is so much admired, that the lower orders are forbidden, under severe penalties, to fish for them, those being reserved for the tables of the great. England produces this flesh in some plenty, though still it must be classed among the more local species. Old Walton found it in the Dove, in the Trent, and some small rivers that run by Salisbury. Sir John Hawkins, one of the annotators on Walton, further mention its being found in many rivers of the north, particularly in the Humber and the Wye, which runs through Herefordshire and Monmouthshire into the Severn. Pennant says it is found in the rivers of Derbyshire; in some of those of the north; in the Tame, near Ludlow; in the Lug, and other streams near Leominster; and in the river near Christ Church, Hampshire. In the Dee river, near the lake of Bala, Merionethshire, North Wales, we have taken it ourselves, and have also received it from the vicinity of Scarborough, in Yorkshire.

PLATE LXXXVIII.

This fish spawns about the beginning of April, or sometimes so late as May, and it is at this season they leave the sea, and ascend rivers to drop their spawn among the stones and gravel in the deeper parts of the streams. They do not multiply fast, and are never found in any of our rivers in abundance, like the Trout and other prolific species. The Grayling is reputed an eager and voracious fish, perhaps without sufficient reason, for although it will sometimes rise to the fly, the minnow, or other baits of an expert angler, it is a cautious fish, lurking close under the shelter of the stones, or herbage on the steeper banks of the stream, where it seems to examine the bait at leisure, and, if disturbed, darts away with amazing swiftness, and hence it happens, the Grayling is more commonly taken by the net than the line.

The Grayling ranks among the number of fishes that live to a great age; it grows, in common, to the length of twelve or fourteen inches: Walton speaks of the largest being eighteen inches in length. Mr. Pennant mentions another, the most considerable in point of size he ever heard of, that was taken at Ludlow; this was above half a yard long, and weighed four pounds six ounces. Upon the Continent they rarely arrive at this size; there are instances, indeed, of its attaining to the size of two feet, but those are rare. The word Grayling is corrupted from Grey-line, or Grey-lined, alluding to the numerous longitudinal lines upon the body of this fish, which distinguishes it in a particular manner from the rest of the Salmon tribe. The peculiar scent observeable at certain seasons in the Grayling, as in the Smelt, has obtained it the name of Thymus and Thymalus *, the odour it exhales at those times being thought

* *Salvian. Belon. Gesner.*

to resemble that of the savory herb thyme, About the beginning of the last century, or earlier, it was indeed imagined, by fanciful writers, to subsist, at particular seasons, on what they denominated Water-thyme; they seem persuaded, the powerful aromatic smell of the fish was contracted from this species of food, an idea apparently borrowed from Ælian*. Others say it rather resembles the smell of new honey than of thyme. Mr. Pennant denies the existence of this smell. We have never, ourselves, observed any such smell, but, as it is stated to be only at particular seasons, and has been attested by various observers, the fact is not to be disputed on trivial grounds. The name *Umbra*, Umber, or as the French call it *Ombre*, can only allude to its swiftness in swimming, the fish, when disturbed, disappearing in an instant, like the transient glimpse of a shadow.

This fish is of an elegant form, the colour silvery, inclining on the sides to cinereous purple, and on the back rather more to dusky. Besides the longitudinal lines, the body is sometimes marked with a few dusky spots. The first dorsal fin in the specimen figured is remarkably large, and contains eighteen rays; the second is small and fleshy; the pectoral fin has twelve rays; ventral seven; anal eleven; and the tail, which is much furcated, nineteen rays.

* An opinion more absurd than this prevailed about the same time. It is gravely told by old Walton, that "the French value the Umber or Grayling so highly, that they say he feeds on gold, and say that many have been found in their famous river *Loire*, out of whose bellies grains of *gold* have been often taken!"

PIKE.

London. Published as the Act directs by E. Donovan & F.C. & J. Rivington, March 1, 1809.

PLATE 72

PLATE CIX.

ESOX LUCIUS.

PIKE.

**** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head flattish above: mouth and throat large: jaws toothed: unequal, the upper one flat, lower punctated: tongue broad, loose: palate smooth: eyes round, moderate size, and lateral: nostrils double near the eyes. Gill-covers large, aperture ample, with from seven to twelve rays. Body elongated, covered with hard scales, above convex, and compressed on the sides: lateral line straight, nearest the back, and scarcely visible: dorsal and anal fin very short, and placed opposite.

SPECIFIC CHARACTER

AND

SYNONYMS.

Snout depressed, jaws nearly equal.

Essox Lucius: rostro depresso subæquali. *Linn. Fn. Suec.* 355.
Gmel. Linn. Syst. Nat: T. 4. *p.* 3. *p.* 1390.

Essox rostro plagio plateo. *Art. Gen. syn.* 10. *syn.* 26. *spec.* 53.

Lucius. *Rondel. pisc.* p. 188.
Gesn. aq. p. 500.
Auson. Mos. p. 122.

PLATE CIX.

Pike. *Will. Icth. p.* 236.
Raij pisc. p. 112.
Penn. Brit. Zool. 3. *p.* 270. *n.* 1.

The Pike inhabits lakes and other still waters in Europe and the northern parts of Asia. It is a strong, fierce, and active fish, swims with great rapidity, grows fast, and preys on reptiles, water rats, the young of aquatic birds, and various other animals. The Pike commits vast depredations in fish-ponds, being extremely voracious, and devouring all kinds of fishes, its own species not excepted. The greatest enemies of the Pike are the Perch and the Stickleback, both of which are armed with formidable spines, well calculated for defence, and sufficiently powerful to intimidate the Pike.

The precise period of its introduction into Britain is not ascertained; it must have been naturalized here before the middle of the fifteenth century, as Pikes were served up in plenty at the celebrated feast given by George Nevil, Archbishop of York, in the year 1466. According to a popular but evidently erroneous opinion, the Pike was not brought into England till the reign of Henry the Eighth. Some parts of the south of Europe are still destitute of this fish, for, if we may rely on the assurance of Amatus, it is neither to be found at present in Spain nor Portugal.

This fish attains to a large size in a shorter time in proportion than most others. In the course of the first year it grows to the length of eight or ten inches, the second to twelve or fourteen, the third to eighteen or twenty. Willoughby speaks of one weighing thirty-two pounds: the largest Mr. Pennant heard of in England weighed thirty-

five pounds. Another, weighing forty-three pounds, was taken in 1752 near Dresden. Dr. Brand saw one seven feet in length taken near Berlin. But the largest of these are still inferior in size to those found in the Lapland Lakes, and in the river Wolga in Russia. Pliny speaks of the Pike weighing nearly a thousand pounds. The largest recorded by later writers within our knowledge was that taken at Kayserslautern, in the Palatinate, in the year 1497, which measured nineteen feet in length, and weighed three hundred and fifty pounds. This is the celebrated fish put into the water by the Emperor Barbarossa in the year 1230, as appeared from an inscription engraved on a ring of gilt copper affixed to the fish, and which clearly proved it to be at the least two hundred and sixty-seven years old. A painting of this extraordinary fish was long preserved in the *Chateau de Lautern*, and the skeleton as well as ring at Manheim. This is the most remarkable instance of longevity in the Pike at present known. Rzaczynski describes one that was ninety years old; but after speaking of the Pike of Kayserslautern this is scarcely worthy mention. It is sufficiently testified by all writers, that the Pike attains to a great size and very considerable age.

As the flesh of the Pike is not fat, and is easy of digestion, it affords an excellent food. In Germany and Lapland, where the Pike abounds, the inhabitants salt and dry this fish, and transport it in barrels to other parts, especially to the Catholic countries, where it forms a considerable article of commercial importance.

The Pike, which is of an olivaceous grey, changes to a fine green or greenish cast in the spawning season, which occurs in spring; the spots on the back and sides, which were before obscure, become then of a yellow or golden hue, the eyes vermillion red, or golden tinged

with red; and the fins of an orange colour spotted with purple. According to Bloch the Pike is sometimes found of a fine orange-yellow spotted with black, and is then distinguished by the Dutch fishermen under the appellation of the King of Pikes.

In one specimen we counted sixteen rays in the dorsal fin, in the pectoral fin ten, ventral seven, anal thirteen, and caudal twenty-three.

OSSEOUS, OR GREATER GAR-FISH.

Published as the Act directs by E. Donovan & F. & C. & J. Rivington. Augs. 1806.

PLATE C.

ESOX OSSEUS.

OSSEOUS GAR FISH.

**** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head flattish above: mouth and throat large: jaws toothed, unequal, the upper one flat, lower punctated: tongue broad, loose; palate smooth: eyes round, moderate, and lateral: nostrils double, near the eyes. Gill-covers large, aperture ample, with from seven to twelve rays. Body elongated, covered with hard scales, above convex, and compressed on the sides: lateral line straight, nearest the back, and scarcely visible: dorsal and anal fin very short, and generally placed opposite.

SPECIFIC CHARACTER

AND

SYNONYMS.

Upper jaw longer; scales osseous.

Esox Osseus: Maxilla superiore longiore, squamis osseis. *Linn.* —*Mus. Ad. Fr.* 2. *p.* 101.

Esox maxilla superiore longiore, cauda quadrata. *Art. Gen.* 14. *Syn.* 27.

Esox Oseus. Le Caiman: radiis primis serratis. *Bloch. t.* 390.

The Osseous, or Greater Gar Fish, is mentioned as a native of the British seas, by Dr. Turton, in his Gmelinian System of Nature;

he informs us, after Gmelin, that it inhabits North America and Asia; and further observes, that it is rarely found on the Sussex coast. Berkenhout, in his "Outlines of Natural History," describes it previously as a British fish, on the authority, as it appears, of a single specimen, that was cast ashore upon the coast of Sussex; but whether Dr. Turton is indebted for his information to this writer or not we cannot presume to determine; the same specimen is most probably alluded to by both.—That a solitary individual at least of this species has been observed on the Sussex coast appears very certain, and having been recorded among the fishes of this country, we are unwilling to pass over such an interesting fish in silence. Should the authority upon which we have introduced it into the British Ichthyology be considered insufficient, it will be at leaſt remembered that the ingenious Mr. Pennant has ventured on the evidence of a less positive circumstance to insert the Sword fish, *Xiphias Gladius*, in his Zoology, as a native of the British seas: the head and pectoral fins of an individual of that species being discovered some years ago on the sandy shores of Laugharn, in Caermarthenshire, induced him to admit it as such, and it must be allowed that the Esox Osseus has an equal claim to our consideration as a British fiſh.

Our figure of this curious fish is taken from a specimen of moderate size; the length from the tip of the jaws to the extremity of the tail not exceeding two feet. The form is elegant and very singular, slender in the girth, and somewhat roundish. The colour of the back pale olivaceous or greenish, becoming whiter on the sides, the belly rather more dusky than the sides, and the fins brownish. The upper jaw is rather advanced beyond the lower, a circumstance not noticed by Lister, who describes the fish, and erroneously remarks that both the jaws are of an equal length. The superior length of the upper jaw Linnæus observes as one of the principal characters of

the species: both the jaws are armed with a number of small and very acute teeth, interspersed with a few of a larger size, every third or fourth tooth being rather larger than the rest. But the species is more peculiarly distinguished by the strong osseous scales with which the whole body is covered, and protected: those are of a rhomboidal form, rather prominent in the middle, and are disposed across the body in an oblique direction. The fins are of a rounded form, and what is very remarkable, the first ray of all the fins, and in the tail, the first ray, both above and beneath, consists of small pointed bony plates, which slope obliquely one over the other, and form by that means a serrated edge. Bloch considers this as a sufficient character of the species, observing, that it differs in this particular not only from the rest of the genus, but from the whole of the fish tribe *. In our specimen the dorsal fin, which is situated close to the tail, consists of eight rays: pectoral fin of nine rays: ventral five: anal ten: and caudal eleven.

* This circumstance however, considered as a specific character, is liable to some misconception in the minds of those not well conversant with the subject, for it will not be forgotten that the anterior part of the fins of the common Sturgeon exhibits a serrated appearance very similar to that of Esox Osseus. In the former fish this serration is indeed occasioned by the united points of many bony rays instead of the peculiar structure of the anterior ray alone, but this is a subject rather for the critical than cursory observer, and might have been avoided. The specifical distinctions assigned by Bloch are in some instances better than either those of Artedi or Linnæus, but in the present he has overlooked an obvious character adopted by the latter in search of another that may be misconceived from the latitude of his expression with regard to all other fishes.

SEA PIKE, OR COMMON GAR-FISH.

London, Pub.d as the Act directs by B. Dunoyer, S.t P.r & C. Rivington, Sept.r 1804

PLATE 74

PLATE LXIV.

ESOX BELONE.

SEA PIKE, OR GAR-FISH

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head flattish above: mouth and throat large: jaws toothed, unequal, the upper one flat, lower punctated: tongue broad, loose; palate smooth: eyes round, moderate size, and lateral: nostrils double, near the eyes. Gill-covers large, aperture ample, with from seven to twelve rays. Body elongated, covered with hard scales, above convex, and compressed on the sides: lateral line straight, nearest the back, and scarcely visible: dorsal and anal fin very short, and placed opposite.

SPECIFIC CHARACTER

AND

SYNONYMS.

Each jaw long, and subulate.

Esox Belone: rostro utraque maxilla subulato. *Gmel. Syst. Nat. T.* 1. *p.* 3. *p.* 1391. *sp.* 6.

Esox rostro cuspidato gracili subtereti pithamali. *Linn. Fn. Suec.* 356.—*Art. Gen.* 10. *Syn.* 27.

PLATE LXIV.

Esox rostro subulato. *Bloch Fisch. Deutschl. I. p.* 236.
Sea Pike, Gar-Fish, or Sea Needle. *Penn. Brit. Zool. v.* 3. *p.* 324. *No.* 154

The Esox Belone, or Gar-fish, of the English, is a common species in all the European seas; migrating annually in large shoals from the depths of the ocean to the shore. They appear on our coasts in the spring, commonly announcing the arrival of the mackrel, but remaining with us for a much shorter length of time than that fish. They deposit their spawn close to the shore, among the rocks, and sea weeds, where the young are hatched, and after a certain time retire. We have seen the young fry of this fish on several of our coasts during the summer months.

As an article of food the Gar-fish is held in far less estimation than the Mackrel, to which its flavour in some degree approaches. By many people the flesh of this fish is considered unwholesome, and even poisonous, no doubt from an unfounded prejudice against it, arising from the singular circumstance of the bone becoming of a fine grass-green colour in boiling. In Holland they are taken in vast quantities, but are seldom eaten, being most frequently employed as bait in the cod fisheries by the Dutch fishermen.

The usual size of the Gar-fish on our coasts, is from a foot to eighteen inches, or two feet in length: sometimes they may attain to three feet in length, but that very rarely. According to Renard this fish is found, at times, in the eastern parts of the world eight feet

long. Dr. Bloch was told by Sir William Hamilton, that a fish of this species was once caught near Naples, that weighed fourteen pounds, and this being an uncommon size for the Gar-fish on that coast was presented to the King as a rarity.

The dorsal fin in our specimen contains seventeen rays; pectoral thirteen: ventral seven: anal nineteen: and caudal twenty-three.

SKIPPER PIKE, OR SAURY GAR-FISH.

London Publ.d as the Act directs by E. Donovan & F.C.H.L. Rivington, Aug.st 1st 1807.

PLATE CXVI.

ESOX SAURUS.

SKIPPER PIKE.

**** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head flattish above: mouth and throat large: jaws toothed: unequal, the upper one flat, lower punctated: tongue broad, loose: palate smooth: eyes round, moderate size, and lateral: nostrils double near the eyes. Gill-covers large, aperture ample, with from seven to twelve rays. Body elongated, covered with hard scales, above convex, and compressed on the sides: lateral line straight, nearest the back, and scarcely visible: dorsal and anal fin very short, and placed opposite.

SPECIFIC CHARACTER

AND

SYNONYMS.

Jaws subulate, and slightly curving upwards, lower one longest: above and beneath spurious fins near the tail.

ESOX SAURUS: maxillis subulatis subascendentibus, inferiore longiore, caudam versus supra infraque pinnulis spuriis.

SAURUS. *Rondel. de Piscibus, lib.* 8. *p.* 232. *Gesn. l.* 4. *p.* 468.

PLATE CXVI.

SKIPPER. *Raii. Syn. Pisc. p.* 169.

The Saury. *Penn. Tour Scot.* 1769.—*Brit. Zool.* 3. *p.* 325. *Linn. Trans. V.* 3. *p.* 60.—*Turt. Gmel. Linn. V.* 1. *p.* 862.—*Shaw. Gen. Zool. V. p.* 1. 114.

Our countryman Ray appears to be the first writer who describes this rare and curious species of Esox as a native of Britain; he speaks of it as a Cornish fish under its provincial name of Skipper. Rondeletius and Gesner previously mention it as a scarce kind among the fishes of the Mediterranean. In 1769 the same fish was again introduced to notice by Mr. Pennant in his Tour of Scotland, and afterwards in his British Zoology, wherein we are informed, that vast numbers of them were thrown ashore on the sands of Leith, near Edinburgh, after a great storm, in November 1768. In the summer of the year 1809 a single specimen was taken near the Isle of Portland, in Dorsetshire, after a hard storm, an account of which, accompanied with a figure of the fish in its natural size, is given by the Rev. Mr. Rackett, F. L. S. in the third volume of the Linnæan Transactions *; and since that period the specimen in our possession occurred likewise on the British coasts. It is altogether singular that this fish has no place in either of the editions of the Linnæan

* This fish appears to be rare on the Dorset coast. Mr. Rackett tells us, that of the fishermen in this part, one only was acquainted with it, and called it a Skipper, the name under which, according to Ray, it was known in his time on the coast of Cornwall. This writer adds, that the species has not been noticed by Linnæus, Gmelin, nor Bloch; and that Pennant has given a very indifferent figure of it in his Tour in Scotland, and has made use of the same plate in his British Zoology. Vide *Linn. Trans. V.* 3. *p.* 60.

Systema; it is inserted by Dr. Turton in his translation of Gmelin on the authority of Pennant.

The length of our fish is about eighteen inches; the body of a long and slender form; not like that of an eel as writers describe, but agreeing precisely with that of the common Gar-fish, (Esox belone.) The snout is subulate, fine, toothless, and slightly curving upwards *. The jaws are of unequal length, the lower being longest, and bending upwards at the tip, in which respect it differs from the figures of Mr. Pennant and Mr. Rackett, in both of which the jaws appear straight and of equal length. Neither do the jaws when closed exhibit that remarkable hiatus or gaping shewn in those two representations; there is a kind of flexuosity in the shape of the mouth when open which might excite such an idea, but upon gently closing it the curvature in the form of one jaw will be found to correspond with the suture of the other, so that the specific character,

* Dr. Shaw obſerves, that "in a ſpecimen figured in the work of Cepede the jaws are repreſented curving upwards, contrary to what has hitherto been obſerved; the ſpecimen figured in the work of Mr. Pennant, as well as that of Rondeletius, and the drawing by Mr. Rackett, have the jaws ſtrait" This is certainly true, and it is therefore to be preſumed that the fiſhes from whence the accounts of the latter-mentioned writers have been taken muſt have ſuſtained ſome injury, or been miſrepreſented; for it is clear Cepede is right in repreſenting the jaws curving upwards: it is indeed evident, from the comparative ſhortneſs of the jaws both in the figure of Mr. Pennant and Mr. Rackett, that neither could have been perfect, the beaks in the fiſh itſelf being nearly twice the length delineated by either.

We could have likewiſe wiſhed that the interſecting lines in the figure drawn by Mr. Rackett, in the Linnæan Tranſactions, had been rendered leſs liable to miſconception; for Dr. Shaw, who apparently never had an opportunity of examining the fiſh, is entirely miſled by it. "In an elegant drawing of this fiſh, (ſays Dr. Shaw) communicated

" maxillis medio hiantibus," assigned to it by Mr. Rackett in the paper above mentioned is by no means applicable.

Some misunderstanding seems to prevail likewise with regard to the colour of the fish: Mr. Pennant describes it as having the back dusky, and the belly bright and silvery; in which particulars he is followed by Dr. Shaw, who remarks that the colour of the whole animal is dusky above and silvery beneath, or that with equal propriety it might be said to be silvery, with dusky or bluish brown back. This is not, however, the fact; the true colour of the fish on the back is a most lovely azure blue, changeable to green, and glossed with purple and yellow instead of dusky, and the lower parts silvery. The fish in this respect does not appear to be described correctly by any writer except Mr. Rackett, who defines it with accuracy in his general description, " *Dorsum viridi-cæru-*

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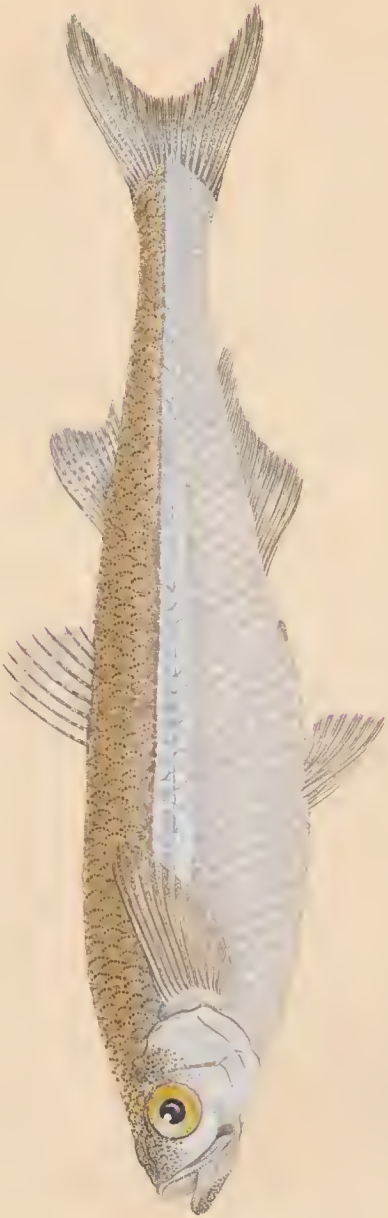
by the Rev. Mr. Rackett, I observe, that the skin appears reticulated by fine lines, decussating each other at equal distances."—This is most assuredly not the natural appearance of the fish; the decussating lines are no doubt intended merely to represent the scales of the fish. The figure given in the British Zoology is still more erroneous, as it appears entirely smooth and destitute of any scale-like appearance. But a greater defect than this in the drawing above adverted to, remains to be mentioned: this relates to the spurious fins at the posterior part of the body both above and beneath, which, instead of being distinct, are seen running one into the other, as if connected by a common membrane throughout, while in the fish itself those fins are perfectly detached from each other. The figure in the British Zoology is less exceptionable in this respect, but even these are inexpressive, every pinnule appearing to be attached by its posterior ray close to the body of the fish. There appears to be also some mistake with regard to the number of those fins; in the figures above noticed, these amount to six above, and six beneath, but in the specimen now before us the number on the upper part is five, and beneath seven.—It was conceived necessary to be thus minute, in order to place the description of this ambiguous, and little known species in its true point of view.

lescens. Venter argenteus." The body has a smooth appearance, the scales with which it is covered being thin and glabrous: the lower part of the body from the gills to the tail is marked with a longitudinal carena or keel, which terminates at the latter part in a somewhat protuberant manner. The species may be readily distinguished by the pinnules or spurious fins on the body near the tail, in which particular it agrees with the Scomber or Mackrel genus; and to this in point of flavour the flesh of the fish is also said to bear a strong resemblance. The tail is remarkably furcated, of a pale brownish colour half way down from the base, and the rest dusky.

All the fins in this species are small: the dorsal fin is placed far down the back, and contains eleven rays, between which and the tail the five distinct pinnules of the upper part of the fish are situated: the pectoral fin is somewhat falcated, and contains eleven rays: and the ventral fin six rays: the anal fin is placed opposite to the dorsal one, and contains eleven rays; and between this and the tail are seven distinct pinnules: the tail itself contains twenty-two rays.

ATHERINE.



London, Feb.ª 1st, 1816. Art. Illness by E.Donovan & F.C.& J. Rivington, Feb.ª 1st 1816.

PLATE LXXXVII.

ATHERINA HEPSETUS.

EUROPEAN ATHERINE.

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Upper jaw rather flattened: gill membrane furnished with six rays: a silvery stripe on each side the body.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body rather pellucid and pale: back tinged with testaceous, and subreticulated with oblique lines of blackish dots.

ATHERINA HEPSETUS: corpore sub pellucido pallido; dorso subtestaceo, lineis obliquis punctorum nigricantium subreticulato.

ATHERINA HEPSETUS: pinna ani radiis fere duodecim. *Gmel. Linn. Syst. nat. T.* 3. *p.* 1396. 183.

ATHERINA HEPSETUS. *Linn.—Hasselq. it.* 382.—*Forsk. Arab. p.* 69. *n.* 101.

Shaw. Gen. Zool. p. 130. *v.* 5. *p.* 1.

ATHERINA. *Gronov. mus.* 1. *n.* 66..

ATHERINE. *Penn. Brit. Zool. v.* 3. *p.* 328. *n.* 157.

PLATE LXXXVII.

The Atherine is a fish of considerable elegance. In size and general similitude it approaches nearest to the Smelt. Like that delicate fish the whole body is semidiaphanous, and partakes of the palest tints of iridescent colours, of testaceous, and pellucid white. Though sometimes confounded with the smelt by inattentive persons, the Atherine is at once distinguished by the distinct broad silvery stripe that passes along the sides the whole length from the gills to the base of the tail, and which in point of splendor even emulates the effect of silver at its highest polish. The more accurate observer need not be informed, that the second or posterior dorsal fin in the common smelt, as in others of the Salmo tribe to which it appertains, is small, fleshy, and destitute of rays, as in the Salmon and Trout, while on the contrary the posterior dorsal fin of the Atherine is large, and consists of a number of distinct rays connected by a thin pellucid film like the other fins.

Naturalists describe the Atherine as a native of the Mediterranean, European, and Egyptian Seas. Forskal found it in the Red Sea: Hasselquist at Smyrna: and Sonnini, among the islands of the Archipelago; Willughby saw it at Venice: Gronovius mentions it as being found on the coast of Holland: Duhamel on different coasts of France: Brunniche, on that of Sheppy island in England; and Pennant as very common in the sea near Southampton, where he tells us it is called a smelt.—According to this last author it never deserts Southampton, and is constantly taken there, except in hard frosts. Our Atherines are from the coast of Devonshire, where we learn this delicate fish is very abundant, but whether it is found also on other coasts of our island, as Pennant intimates, we are unable to determine. By accident, or in a few solitary instances, it may have been found on other coasts, but we must observe that our enquiries after it in other

places have hitherto proved fruitless. On the eastern coasts we have pretty good authority for believing it is not found, or at least in any number as at Southampton.

The author of the British Zoology, Mr. Pennant, rather mistakes the ordinary size of the Atherine, in stating its length at only four inches and one fourth, those of moderate dimensions being from five to six inches long. The head is broad, flattish, very sloping in front, and marked down the center with an interrupted carena or ridge: the gill covers silvery, and the rest of the head pellucid and speckled with fuscous. The body is about the thickness of the common smelt, and is tinged with a variety of delicate tints as in that fish, the upper parts only inclining more to pale testaceous, or yellowish brown. The scales on the back seem at first glance of a lozenge form; on close inspection these appear obtusely circular and marked near the edge, or outer margin, with a series of dusky dots, which from their disposition give the whole back the appearance of being reticulated by oblique lines of dots; those dots are sometimes confusedly broken, and are larger or smaller on different parts of the same fish, but in all are so distinctly marked as to give the back the subreticulated appearance before mentioned. All the fins, except the ventral, are very delicately speckled with fuscous. The lateral stripe is silvery, changeable in the shade to steel blue, and marked down the middle with a longitudinal series of little elevations which constitute the lateral line. This stripe on the sides is straight as Mr. Pennant mentions: we could never however discover the row of black dots beneath it, which this writer describes in his fish.

Linnæus, who considers the number of rays in the anal fin as a criterion of this species, states them at "about twelve:" a specific

character so vaguely expressed cannot be depended on, the more especially since recent observations have proved the fallacy of this character. Bloch found thirteen rays in the anal fin of his fish; and the number in various specimens examined by ourselves to ascertain this point varied from fourteen to fifteen, sixteen, and seventeen. Mr. Pennant neglected to count the rays in any of the fins, so that it is impossible to determine their number in the anal fin of his fish. The individual selected by us for representation contained seventeen rays in the anal fin. In the first dorsal fin were eight rays, in the second eleven: the pecoral fin contained thirteen rays: the ventral six; and the tail, which is much furcated, fifteen.

This fish is in season from March to the latter end of May, or beginning of June, when the spawning time commences. Sonnini observed this fish in the Archipelago, where we learn from his account the modern Greeks call it *Atherinos*, a name derived from its ancient appellation *Atherina*. They assemble, according to this author, in vast shoals near the shores of most of the islands, and are sometimes taken in prodigious quantities by a very simple device. A man being provided with a long stick, at the end of which is fastened a horse's tail, or a piece of black cloth, walks along the shore in calm weather and trails it through the water. The Atherines gather in a crowd round it, and follow its motions; in this way they are conducted into some opening formed by two rocks, which is closed by a net fastened to two sticks, when the water is agitated, and the fishes secured by drawing the extremity of the net together. The Atherine, it is added by Sonnini, held up to the light is diaphanous, and when dressed, even by frying, the spots or little black specks of its back are still very apparent, as well as the longitudinal stripe on the sides of the body, which become only blackish and more narrow.

MULLET.

77

London. Pub.d as the Act directs by E.Donovan, & F.& C.Rivington. April 1.1802.

PLATE XV.

MUGIL CEPHALUS.

MULLET.

* *ABDOMINALES.*

GENERIC CHARACTER.

Head: Lips membranaceous: the lowered one carinated within. No teeth *; in the upper part of the mouth a double fang-like callosity. Branchiostegeous-membrane with seven curved rays; covers smooth and rotundated. Body whitish.

SPECIFIC CHARACTER

AND

SYNONYMS.

Four rays in the first dorsal fin.

MUGIL CEPHALUS: pinna dorsali anteriore quinque radiata. *Linn. Syst. Gmel. T.* 1. *p.* 3. *p.* 1397. 184. *sp.* 1.—*and*

MUGIL ALBULA: pinna dorsali anteriore quadriradiata. *Gmel. T.* 1. *p.* 3. *p.* 1340. 184. *sp.* 2.

MULLET. *Penn. Brit. Zool. p.* 329. *sp.* 158.

* This is an erroneous opinion of several authors beside Linnæus and Gmelin. Its teeth are minute, but sufficiently apparent in such of the genus as we have had an opportunity of inspecting; and are disposed along the exterior margin of the lips, especially the upper one:—these teeth or denticulations are visible enough in Mugil Cephalus.

PLATE XV.

We are persuaded the distinctions between *Mugil Cephalus* and *Mugil Albula*, as stated in the *Systema Naturæ*, are by no means sufficient to prove them different. It is said, that *Cephalus* has five rays in the first dorsal fin, and inhabits Europe. Albula differs in having only four rays in the dorsal fin, and inhabits America; and yet Gmelin refers amongst the synonyms of Mugil Cephalus to *Gronovius*, who describes but four rays in that part of his fish:—the only character Gmelin assigns to his second species, *Albula*.

A slight attention to the accounts of authors on Ichthyology will convince us that the number of rays in the fins of fishes are often inconstant. *Gmelin* acknowledges that M. Cephalus, having five rays in the dorsal fin, is an European kind; and the observations of Pennant, Block, and others, prove, that, with only four rays in the dorsal fin, is an European species also. The existence of *Albula* rests on the authority of Catesby and Brown; the first describing it as a native of Carolina, and the other of Jamaica. Whether it differs specifically from Cephalus may be doubted, but the character given of it does not remove it from the foregoing species. Block says, Mugil Cephalus is found in every part of the world, and adduces the evidence of Brown as a proof that it is found in Jamaica, so that he considers them both as the same species.

Linnæus describes but one European *Mugil*, and he could certainly have meant no other by his Cephalus than our species. In the synonyms quoted in the early editions of the *Systema Naturæ*, the number of these rays in question are stated both at four and five. And we think they must be both the same species, accidentally differing in the specimens examined by different authors.

PLATE XV.

The Mullet is an inhabitant of the salt waters. It frequents sandy bays, and the entrances of great rivers, and in the summer months has been known to enter into fresh waters, as is supposed to deposit its spawn. They swarm on many of the European shores, and particularly those of the Mediterranean, where they are taken in a kind of wear contrived on purpose; for they are a cunning fish, and not taken in nets without some difficulty. It is said, that if one of them escapes out of the net by leaping over its side, the rest of the shoal will assuredly follow it, and escape also.

On the coasts of Italy, where this fish is very abundant, the natives make their botargo of the roe of the females. This part is taken out entire, and covered with salt for four or five hours, then slightly pressed between two boards, and, lastly, washed and dried in the sun for about fourteen days; in the month of August it is fit for use in eight or ten days.

The length of this species is about a foot or fifteen inches. It has five rays in the dorsal fin, in the second eight: pectoral fin seventeen: ventral fin one spiny and six soft rays: anal fin nine: tail twelve, and two very short ones on each side.

COMMON FLYING FISH.

78

London, Pub.d as the Act directs by E. Donovan & F.& C. Rivington, May 1.st 1803.

PLATE XXXI.

EXOCOETUS VOLITANS.

COMMON FLYING FISH.

* *ABDOMINALES.*

GENERIC CHARACTER.

Head scaly: mouth without teeth: jaws connected at each side: in the gill-membrane ten rays: body whitish: abdomen angulated: pectoral fins large, and formed for flying: anterior part of the rays carinated.

SPECIFIC CHARACTER

AND

SYNONYMS.

Belly carinated on each side.

EXOCOETUS VOLITANS: abdomen utrinque carinato. *Amoen. ac.* 1. *p.* 321. *Art. gen.* 8. *syn.* 18. *sp.* 35.

WINGED FLYING FISH. *Penn. Brit. Zool.* 3. *p.* 333. *sp.* 159.

An interesting creature, introduced into the present work on the authority of Mr. Pennant, who in his turn observes, that he can produce but a single instance of its being taken on the British coasts;

in June, 1765, one was caught at a small distance below Carmarthen, in the river Towey, being brought up by the tide which flows as far as the town. It was seen by John Strange, Esq. at Carmarthen, and an account of it communicated to Mr. Pennant.

The vastly disproportionate size of the pectoral fins in this genus of fishes, compared with others, affords them an extraordinary advantage in effecting their escape from the larger and more voracious kinds when closely pursued in the water, but this advantage exposes them to a far greater number of enemies, and they not unfrequently escape danger in their native element to become the prey of Gulls, of Corvorants, and other aquatic birds that hover over the surface of the water to catch them in their aërial flights. It can only remain for a short time suspended in the air, for the instant its fins become dry, it must again dip into the water to moisten them. They often quit the water in shoals, and sometimes alight on board of ships in immense numbers in warm climates.

Of this genus, two species are known, beside the present, *E. Volitans:* the latter may be easily distinguished by having each side of the belly carinated, and the ventral fins placed much nearer to the head than in either of the others. It inhabits the Red and American seas, and also those in the warmer parts of Europe; especially the Mediterranean, where it is very common.

Our specimen is somewhat larger than the figure represents. In the dorsal fin are fifteen rays: pectoral sixteen: ventral eight: anal fifteen; and in the tail, twenty.

PILCHARD.

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London, Pub.d as the Act directs by N. Donovan, & H. K. Corrington, May 1.1803

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PLATE LXIX.

CLUPEA PILCHARDUS.

PILCHARD.

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head compressed; mouth compressed, denticulate within: jaws unequal, upper one with serrated mystaces: tongue short and rough, with inverted teeth: eyes moderate, round, and margined. Gills setacous: cover, either of three or four plates, membrane with eight rays. Body compressed, elongated, covered with scales of moderate size: lateral line straight, near the back, and running parallel with it: belly carinated and serrated: usually seven rays in the ventral fin: tail bifurcated.

SPECIFIC CHARACTER

AND

SYNONYMS.

Silvery, scales large and adhering firmly, upper jaw ascending: dorsal fin placed centrally.

CLUPEA PILCHARDUS: argentea, squamis magnis arcte infixis, maxilla superiore adscendente, pinna dorsali in medio posita.

PLATE LXIX.

CLUPEA PILCHARDUS: *Bloch. t.* 406.

Clupea ♂. Arted. Synon. 16.?

Pilchard. *Will. Ichth.* 223. *Ray. syn. pisc.* 104. *Borlase Cornwall.* 272. *Penn. Brit. Zool.* 3. *p.* 343.

That casual observers should be apt to confound the Pilchard with the Herring ought not to excite surprise: they cannot but observe the very close affinity of these two species, and may be readily led to believe, from the inferior size of the Pilchard, that it must be the Herring not yet arrived at its perfect growth, and maturity. It is more remarkable, that experienced naturalists should have so implicitly assented to this notion. Linnæus does not mention the Pilchard, although our countryman Ray, from whom Linnæus derived no inconsiderable share of his ichthyological knowledge, gives it as a species distinct from the Herring. Gmelin also omits it in the last edition of the Systema Naturæ. Schonvelde was supposed to have noticed it, but it is not certain that the *Peltzer* of that author is the same as our fish, although Pennant refers to it as such among his synonyma. Bloch thinks it is very likely that Schonvelde's *Peltzer*, a fish taken on the coast of Holland (according to that writer,) may be of a different species, and recommends an enquiry to be made among the Dutch naturalists to determine this point. Should it really prove distinct, it would seem that Bloch is the only continental writer who has particularly noticed, or well considered this fish, though its history and peculiarities have been so copiously detailed by several English writers, and by Borlase in his History of Cornwall especially. Even Bloch, it seems, was indebted to an English correspondent (Mr. Hawkins) for the only specimens of the Pilchard he was

able to obtain, previous to the publication of his work on Fishes. This circumstance is the more singular, since we have heretofore been taught to believe it an abundant fish on all the European shores, an idea that seems to us the less certain from the observations of Bloch, and from the silence of so many ichthyological writers as have appeared at various times upon the continent respecting it. We cannot conceive that the Pilchard is peculiarly British, having ourselves seen it from the Mediterranean, but believe upon the whole that it is more abundant on our coasts, and far better known in this country than in any other part of Europe.

The comparative view which Pennant draws between our fish and the common Herring is judicious, and will serve to shew the characteristic differences between those two fishes in the clearest point of view. The specimens he examined were both of the same length, namely, nine inches and an half each. "The body of the Pilchard (he says) is less compressed than that of the Herring, being thicker, and rounder, the nose short in proportion, and turned up, and the under jaw shortest. The back more elevated: and the belly less sharp. The dorsal fin of the Pilchard is placed exactly in the center of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the Herring dips at the head, the dorsal fin being placed only three inches eight-tenths from the tip of the nose; that of the Herring four inches one-tenth. The scales of the Pilchard adhere very closely, whereas those of the Herring very easily drop off. The Pilchard is in general less than the Herring. The Pilchard is fatter, or more full of oil *."

* Brit. Zool. Vol. III. p. 346.

The critical remarks of Bloch upon those two fishes so nearly agree with those of Pennant, that it would be needless to repeat them. After an accurate comparison between them, he is persuaded (as indeed every one must be who examines them with attention) that they are specifically distinct. He speaks of the central position of the dorsal fin, and the magnitude of the scales, in the Pilchard, and those characters are alone sufficient to prove it distinct as a species from the common Herring, to which it is so closely allied.

Our principal fishery for the Pilchard is off the coast of Cornwall, where they appear about the middle of July in vast shoals, but disappear again before winter. They are caught in great numbers by the inhabitants of some parts of Cornwall for the purpose of extracting oil from them. They are also dried, and sent in barrels as an article of export to other countries.

The pectoral fin in the specimen we have figured contained fixteen rays: ventral eight: anal seventeen: dorsal eighteen, and tail thirty-two.

SHAD.

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PLATE 80

PLATE LVII.

CLUPEA ALOSA.

SHAD.

**** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head compressed; mouth compressed, denticulate within: jaws unequal, upper one with serrated mystaces: tongue short and rough, with inverted teeth: eyes moderate, round, and margined. Gills setaceous: cover, either of three or four plates; membrane with eight rays. Body compressed, elongated, covered with scales of moderate size: lateral line straight, near the back, and running parallel with it: belly carinated and serrated: usually seven rays in the ventral fin: tail bifurcated.

SPECIFIC CHARACTER

AND

SYNONYMS.

Sides with black spots: snout bifid.

Clupea Alosa: lateribus nigro-maculatis, rostro bifido. *Linn.*—*Gmel. Syst. Nat. p.* 1404. *sp.* 3.

Clupea apice maxillæ superioris bifido, maculis nigris utrinque. *Art. Gen.* 7. *syn.* 15. *sp.* 34.

PLATE LVII.

Clupea maxilla superiore in apice crenata. *Bloch. Fisch. Deutschl.* 1. *p.* 209. *n.* 3. *t.* 30. *f.* 1.

Harengus dorso et apicis vertice ex albo flavescentibus, &c. *Klein. miss. pisc.* 5. *p.* 72. *t.* 19. *f.* 4.

Thrissa. *Aldrov. pisc. p.* 500.

Laccia, Alosa. *Salvian aq. p.* 103, 104.

Clupea, SHAD. *Will. Ichth. p.* 227. *t. p.* 3. *f.* 1.—*Raj. pisc. p.* 105. *n.* 6.

SHAD. *Brit. Zool.* 3. *p.* 296. *n.* 5.

ALOSE, in *France*. Laccia, *Italy*. Saccolos, *Spain*. Alse, Else, May-fish, and Gold-fish, *Germany*. Elft, *Holland*. Brisling, Sildinger, Sardeller, *Denmark*. Shelesniza, Beschenaja ryba, *Russia*. Sardellæ-baliik, *Turkey*. Saghboga, *Arabia*.

The colours of this common fish when living, are remarkable for their peculiar beauty. Its back is of a dusky blue, changeable to green and yellow; the sides silvery, and elegantly glossed with various hues; the belly white; or faintly tinged with yellow.

Commonly the whole fish when first taken from the water, glows with a pale but a lovely golden yellow, with the exception of the front of the head, which is transparent; and the spots, which on close inspection are black, appear at that time of a purplish hue. The Linnæan specific character of this fish, is principally taken from those spots, which are disposed in a longitudinal series along the sides. Those spots vary much in their strength of colour in different

species, either from the condition of the fish, its age, or the particular season of the year. Sometimes they are remarkably vivid, at others scarcely discernible, and even in the same fish they appear much stronger, after scales on the sides are partly rubbed off. The lateral spots by which the shad is distinguished, in some individuals amount to ten: they do occasionally occur with only four or five, but the intermediate numbers about seven or eight are the most frequent. An opinion prevails, that as the fish grows old, those spots fade away, and at last entirely disappear. Independant of those lateral spots, there are commonly two others upon the tail, one of which is situated on the upper, and the other on the lower edge, contiguous to the base.

The Shad is known as an inhabitant of many parts of the world. In the Mediterranean, the Persian, Egyptian, and American seas, we learn it to be most abundant: it also swarms in those of the northern parts of Europe at some times of the year. The haunts of this fish are the open sea, which it leaves at certain seasons, in order to ascend rivers to deposit its spawn, in places of convenient security.

The time of its appearance in the same rivers is pretty constant, but they do not ascend all rivers at the same time. This may vary according to the nature of the climate, and may be also governed in some measure by the temperature of the season. In the Nile for instance, it is seen in January, or even in December. It passes from the sea up the Rhone in March: in the Wolga, Rhine, and Elbe, it is seldom observed till April or May, and in some of the rivers on the continent its appearance is so regular about the month of May, and not before, that it has acquired the name of *May-*

*Fisch**. All those rivers it leaves again in autumn, returning at that season to the sea. It is not a little extraordinary, that the fry of the Shad has never yet been ascertained, although those first ascend rivers to deposit their spawn, and must be therefore hatched in such places as may be easily visited by the inquisitive naturalist. We are persuaded there need no longer exist any doubt as to the identity of the fry of this fish. There is a diminutive species of Clupea, called a white bait, that is found in abundance during the summer, in the Thames, near Greenwich, which is evidently the young of the common Shad, notwithstanding the opinion of Mr. Pennant to the contrary. This fish has excited much curious speculation. The author of the British Zoology, enters at length upon the subject, and after endeavouring to prove that it is neither the fry of the Shad, the Sprat, the Smelt, or the Bleak, concludes that they approach the nearest to the Bleak, under which head he describes it.

The Thames affords this fish in shoals, from the beginning of May till the middle of June, about which time the fishermen are prohibited from taking them, because at that time they are in full spawn. A short time after they again disappear, only a few stragglers remaining in the river till the end of July, or beginning of August, when the fishermen find no more till the summer following.

Being considered as a poor insipid food, the Shad bears an inferior price compared with other fish in the neighbourhood of London, a fish of two or three pounds weight being commonly sold for about

* Bloch.

sixpence. They are usually eaten fried with parsley, or stewed. Mr. Pennant speaks of the Severn Shad as a delicate fish at the time of its first appearance in that river: in that part which flows by Glocester, they are taken in nets in plenty, and sell at times dearer than Salmon. This writer tells us the Severn Shad is sometimes sent to London, where the fishmongers distinguish them from those of the Thames kind by the French name of Alose.

The flesh of the Shad is not considered wholesome by some people. In Russia, where they appear in great abundance in the Wolga, and other rivers, they are held in such abhorrence, that when they are entrapped with other fish in the nets, the fishermen throw them back again into the water. They call the Shad Beschenaja ryba, or the enraging fish, having prepossessed themselves with the silly notion, that it enrages even to madness those who eat of it. As Hasselquist relates, it is found in the Mediterranean near Smyrna, and on the coast of Egypt near Rosetta. In the months of December and January, this fish, he tells us, ascends the Nile as far as Cairo, where it is caught, and dressed in a particular manner with a stuffing of pot marjoram; and the fish thus prepared for food, he assures us, will very nearly intoxicate the eater. The Arabs are fond of this Fish, which they cure by first smoking them, and then drying them in the air; they are eaten with dates.

There is a smaller sort of Shad sometimes accidentally taken about the entrance of the River Thames, which the fishermen consider as a kind of herring. This we have received from correspondents at different seasons of the year, and on the most attentive comparison, are convinced they are only the common Shad, not yet arrived at full maturity. The fishermen have the superstitious notion, that every

shoal of herrings is preceded by one of those fishes, who is therefore denominated by them, the leader, mother, or the queen of herrings. This is to all appearance the same fish as Mr. Pennant tells us, is taken in great numbers in the Severn, immediately after the true Shad leaves that river; and which the people near Glocester call the Twaite. This Mr. Pennant observes, "differs only from a small Shad, in having one or more round black spots on the sides; if only one, it is always near the gill, but commonly there are three or four, placed one under the other." In other respects they perfectly agree, except in size, the Twaite weighing from half a pound to two pounds at the utmost, while the true Shad weighs sometimes eight pounds, though commonly only from four to five pounds each. The *mother-herrings* we have seen, have scarcely ever exceeded the size of the common herring.

In England there is nothing peculiar in the fishery of the Shad, but in Germany, and other countries on the European continent, the mode of capture sometimes pursued in the Shad fisheries, is altogether singular. The fishermen in those parts have an idea, that the Shad is terrified at storms, and troubled waters, that it loves quiet, and is delighted to excess with the sounds of music. They therefore seek the most retired parts of the rivers, which the Shad frequents, to spread their nets. To those nets they fasten bows of wood, to which are suspended a number of little bells, in such a manner as to chime in harmony together, whenever the nets are moved. The Shad once attracted by the sound to the snare, will not, they say, attempt to make their escape, while the bells continue to jingle. And even while the fishermen are in the act of drawing up the nets, the poor fish lie listening with motionless surprise to the alluring sounds: their efforts to retreat from the fatal

net are paralysed, and they submit with scarce a struggle to the destiny that awaits them. The idea of thus enticing the Shad to the snare, by the power of music, seems to be derived from days of classical antiquity. Ælian speaks of this fish being attracted by the sound of castagnettes made with shells, and rang in unison with the songs of fishermen.

The Shad feeds on worms, insects, and the smaller kinds of fish. In its turn it is the prey of larger fishes. The Perch is among the number of its greatest enemies.

In the dorsal fin of the specimen represented, are twenty rays: pectoral fin nineteen rays: ventral fin twelve rays: anal fin twenty one; and tail twenty-six.

WHITE BAIT.

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PLATE 81

PLATE XCVIII.

CLUPEA ALOSA, *jun.*

WHITE BAIT.

WHITE BAIT. *Appendix to the* BLEAK. *Penn. Brit. Zool. vol.* 3. *p.* 372.

WHITE BAIT. *Var.* of CYPRINUS ALBURNUS, BLEAK. *Turt. Syst. Nat. v.* 1. *p.* 885.

WHITE BAIT. Append. CARP. *Shaw Gen. Zool. vol.* 5. *p.* 1. *p.* 246.

When the true character of the White Bait becomes more generally understood, and the veracity of those remarks we shall offer in the sequel is sufficiently confirmed by the observation of other naturalists, it will perhaps appear that it has remained with us to remove the mysterious veil that has hitherto enveloped the history of this little fish in obscurity. To what peculiar circumstances we are to attribute the errors that have prevailed among writers respecting this fish, we cannot easily imagine: unless, as we suspect, they never had an opportunity of examining it; but that they have actually been deceived we are perfectly satisfied. This assertion is not advanced on slight surmises, for some pains has been taken by us to investigate the history of this heretofore ambiguous fish: we have examined it repeatedly, and have now before us a great variety of specimens eluci-

datory of the different transitions of its growth from a diminutive size, to the full dimensions of those delineated in our plate. Every one of those bear the most striking semblance of the parent fish, and afford an incontrovertible evidence that the White-bait is really the fry of the common Shad. We shall premise our enquiry by introducing the observations of Mr. Pennant concerning it, in the result of which he labours to prove that the White-bait is not the young Shad, or even a fish of the *Clupea*, but one of the *Cyprinus* genus, approaching nearest to the Bleak, and shall conclude with stating our reasons for dissenting from an opinion so long established and so uniformly adopted by later writers.

" During the month of July (says Mr. Pennant) there appears in the river Thames, near *Blackwall* and *Greenwich*, innumerable multitudes of small fish, which are known to the *Londoners* by the name of *White Bait*. They are esteemed very delicious when fried with fine flour, and occasion during the season a vast resort of the lower orders of epicures to the taverns contiguous to the places where they are taken at."

" There are various conjectures about this species, but all terminate in a supposition that they are the fry of some fish, but few agree to which kind they owe their origin. Some attribute it to the Shad, others to the Sprat, the Smelt, and the Bleak. That they neither belong to the Shad, nor the Sprat, is evident from the number of branchiostegous rays, which in those are eight, in this only three. That they are not the young of Smelts is as clear, because they want the *pinna adiposa*, or rayless fin; and that they are not the offspring of the Bleak is extremely probable, since we never heard of the White-bait being found in any other river, notwith-

standing the Bleak is very common in several of the *British* streams: but as the White-bait bears a greater similarity to this fish than any other we have mentioned, we give it a place here as an appendage to the Bleak; rather than form a distinct article of a fish which it is impossible to class with certainty."

"It is evident that it is not of the Carp or *Cyprinus* genus: it has only three branchiostegous rays; and only one dorsal fin; and in respect to the form of the body, it is compressed like that of the Bleak.

"Its usual length is two inches: the under jaw is longest: the irides silvery, the pupil black: the dorsal fin is placed nearer to the head than to the tail, and consists of about fourteen rays: the side line is straight: the tail forked, the tips black.

"The head, sides, and belly are silvery; the back tinged with green."

In the General Zoology of Dr. Shaw, the White-bait is described as a species of the Carp or Cyprinus genus. It is observed by this writer, that "This small fish, which is extremely plentiful at particular seasons in the river Thames, is supposed to be the young of some species of the genus Cyprinus, though it is not agreed to what species it should be most properly referred: its general history is so well detailed by the ingenious author of the British Zoology, that it will be best given in his own words." Dr. Shaw concludes with the observations of Mr. Pennant, as above quoted.

The White-bait is introduced by Dr. Turton, as a variety of the Bleak, *Cyprinus alburnus*. He describes it as having the "Lateral

line straight." The general description is to the following effect. "Pupil black; iris silvery; lower jaw longer; head, sides, and belly silvery; back tinged with green: dorsal fin nearer the head than the tail, and with about fourteen rays: tail forked, the tips black."—It will be proper to add, that in the Gmelinian *Systema Naturæ* no mention is made of this fish, and that Dr. Turton has inserted it, to all appearance, on the authority of Mr. Pennant.

Our observations commenced with stating the White-bait to be the genuine offspring of the Shad, and consequently of the Clupea, instead of Cyprinus genus, as the preceding authors consider it. This we shall have little difficulty in determining. To speak with indecision on a point that admits of not the slightest doubt is needless: when we deliver an opinion merely it is becoming to express it with diffidence; but indecision and diffidence are misapplied to matters removed beyond the possibility of doubt, and such is the fact exactly with regard to the White-bait.

Every circumstance considered, we cannot avoid concluding, that much of the prevailing errors respecting the White-bait has originated from the incautious observations of Mr. Pennant on this subject:—that this author never saw the White-bait; and that succeeding Naturalists, too implicitly relying upon his observations, have been inadvertently precipitated into those errors which the most casual examination of the fish in question would have enabled them to detect. If, however, contrary to this suggestion, Mr. Pennant ever did examine the fish, his specimens must have been either in a most imperfect state, or his investigation of it unpardonably hasty and negligent. His figure conveys no just idea of the fish, and his critical animadversions are laboriously intricate and defective. He

tells us, among other particulars, that the White-bait "neither belongs to the Shad nor the Sprat, as is evident from the number of branchiostegous rays, which in those are eight, in this (the White-bait) only three." This remark is incorrect: the branchiostegous rays were uniformly eight in number in at least fifty specimens we examined, with the view of ascertaining the fact exactly. The fish represented in our Plate as just emerging above the surface of the water to seize its prey, has the gill membrane expanded, in order to render those brancheostegous rays apparent. The number of those rays determines at once that it cannot be of the Cyprinus genus, which is distinguished by having only three such rays, instead of eight. Mr. Pennant further remarks, that "it is impossible to class this fish with certainty;" but in what respect this ambiguity consists is not for us to say. The White-bait certainly possesses every criterion of the species, as evidently as the parent, or full grown fish. Its outline is the same, the fins are alike; it exhibits the same serrations on the abdomen, and cleft on the snout; and what is even remarkable in a fish of this small size, the lateral range of dusky spots are perceptible through the beautiful silver scales, as in the larger fish. It exhibits in a word a most perfect but diminished figure of the common shad, not a solitary character excepted.

From the above detail, we conceive there cannot remain the slightest hesitation in removing the White-bait from the Cyprinus to the Clupea genus, and restoring it to its parent species. So perfectly were we satisfied of its propriety, that having previously given a Plate of the Shad, we had been almost induced to wave inserting this little fish in the present work. Conceiving, however, on further reflection, that by introducing it to notice, with an accurate representation of the fish, in the size it is usually known by

the name of White-bait, it would tend to elucidate a point hitherto considered doubtful by our Ichthyologists, we were afterwards persuaded to insert it. Any further description of the fish we presume to be unnecessary: the figures are correct, and those will sufficienty testify, on comparison with the common Shad, that the White-bait is nothing more than the young of that individual species.

ANCHOVY.

London. Pub.d as the Act directs by E. Donovan, & F.& C. Rivington, Dec.r 1.1803.

PLATE 82

PLATE L.

CLUPEA ENCRASICOLUS.

ANCHOVY.

PISCES ABDOMINALES.

GENERIC CHARACTER.

Head compressed; mouth compressed, denticulate within: jaws unequal, upper one with serrated mystaces: tongue short and rough, with inverted teeth: eyes moderate, round, and margined. Gills setaceous: cover, either of three or four plates, membrane with eight rays. Body compressed, elongated, covered with scales of moderate size: lateral line straight, near the back, and running parallel with it: belly carinated and serrated: usually seven rays in the ventral fin: tail bifurcated.

SPECIFIC CHARACTER.

Upper jaw longest.

CLUPEA ENCRASICOLUS: maxilla superiore longiore. *Gmel. Syst. Nat.* 1405. *Sp.* 4.

Clupea maxilla superiore prominente. *Bloch Fisch. Deutschl.* 1. *p.* 212. *n.* 4. *t.* 30. *f.* 2.

Anchovy. *Will. Icth.* 225.

Raii Syn. pisc. 107.

Penn. Brit. Zool. V. 3. *p.* 347. *Sp.* 163.

PLATE L.

The true Anchovy has been observed on the coast of Hampshire, where a specimen at this time in our possession was caught only a few years since. Mr. Ray, as Pennant observes, discovered this species in the estuary of the Dee about a century and an half ago; after which time no notice was taken of its resorting to the British coasts, till a few were caught near Mr. Pennant's house at Downing, in Flintshire, in the year 1769.

At certain seasons the Anchovy, like the sprat and herring, appears in vast shoals on all the sea coasts of the southern parts of Europe, as well as in the north seas, and the Atlantic ocean. Bloch acquaints us that it is found in the Baltic sea, but rarely. Upon the coasts of Portugal, Spain, and the south of France and Italy, they are taken in the greatest plenty. They are caught from the month of December till March, but the principal fisheries commence in May, and continue till the end of July. The Anchovies of Brabant are in much esteem, as are also those of Gorgona, a small island lying to the westward of Leghorn, where they are taken in vast numbers, and beheaded, gutted, and pickled for exportation; the Anchovy being in very general use as a sauce for other fish, which occasions a considerable demand for this article. The Greeks and Romans, we are told, were well acquainted with this fish, and prepared a *garum*, or kind of pickle from it, which they held in considerable estimation.

Three or four inches at the most is the usual length of the Anchovy when full grown. Sometimes they are found still larger. The specimen in our possession is about four inches and an half in length. In the dorsal fin are fifteen rays; pectoral fin fifteen; ventral fin seven; anal fin fourteen; and in the tail twenty-four.

BARBEL.

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London, Pub.d as the Act directs by J. Donovan & F.K.C. Rivington, May 1.1803.

PLATE XXIX.

CYPRINUS BARBUS.

BARBEL.

ABDOMINALES.

GENERIC CHARACTER

Mouth without teeth: gill-membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER.

Anal fin with seven rays: beards four: second ray of the first dorsal fin serrated on both sides.

Cyprinus Barbus: pinna ani radiis 7, cirris 4, pinnæ dorsi radio secundo utrinque serrato. *Mus. Ad. Fr.* 2. *p.* 107.

Cyprinus maxilla superiore longiore, cirris 4, pinna ani ossiculorum 7.

Cyprinus maxilla superiore, prominente, cirris quatuor ad os. *Bloch.*

Barbel. *Penn. Brit. Zool.* 3. *p.* 357.

A common inhabitant of most fresh waters in Europe, and easily distinguished from the other species of Carp or Cyprinus genus to which it belongs, by the upper jaw being advanced far beyond the

lower one, and in having the four beards appendant, from which the appropriate name of Barbus or Barbel is derived. This fish during the summer prefers the rapid currents and shallows of rivers, and retires at the approach of winter to the more still and deeper places. They live in societies; lurking in holes along the sides of the water under the shelter of the steepest banks, and feed on smaller fish and worms, and flesh of all kinds, for which they dig in the banks like swine. In the day time, they love to lurk occasionally among weeds and between the stones in retired parts of the river, and wander out in the night in search of prey. They spawn in April, and begin to be in season in May and June.

The flesh of the Barbel was never in great esteem for the table. Mr. Pennant qnotes a passage in *Ausonius*, which, as he observes, is no panegyrie on its excellence; and he adds, himself, that "they are the worst and coarsest of fresh-water fish, and seldom eat but by the poorer sort of people, who sometimes boil them with a bit of bacon to give them a relish."

"The Barbel," says old Walton, "though he be of a fine shape, and looks big, yet he is not accounted the best fish to eat, neither for his wholesomeness nor his taste: but the male is reputed much better than the female, whose spawn is very hurtful."

Again, when speaking of *Rondeletius*, he makes this remark on the spawn, "we agree with him, that the spawn of the Barbel, if it be not poison, as he says, yet that it is dangerous meat, and especially in the month of May; which is so certain, that Gesner and *Gassius* declare, it had an ill effect upon them, even to the endangering of their lives." Sir J. Hawkins, in his annotations on

Walton, says, "Though the spawn of the Barbel is known to be of a poisonous nature, yet it is often taken by the country-people medicinally; who find it at once a moſt powerful emetic and cathartic. And, notwithstanding what is said of the wholesomeness of the flesh, with some constitutions, it produces the same effect as the spawn. About the month of September, in the year 1754, a servant of mine who had eaten part of a Barbel, though, as I cautioned him, he abstained from the spawn, was seized with such a violent purging and vomiting, as had like to have cost him his life." According to Mr. Pennant, also, the roe is very noxious, affecting those who unwarily eat of it with a nausea, vomiting, purging, and a slight swelling; and many similar remarks might be adduced, were it necessary, to prove from the most prevalent opinion, among writers, either ancient or modern, that the flesh of the Barbel is indifferent; and the roe, at leaſt, in certain seasons of the year, is poisonous or unwholesome. Mr. Bloch, however, (and, as he says, from experience) fully contradicts this prejudice, as he terms it, against the Barbel: the flesh, he observes, is white and of a good flavour; and of the eggs he has eaten, with all his family, and not a single person among them has ever been incommoded.

Having taken occasion to advert to the "Complete Angler," of that experienced fisherman, old Walton, and the notes of Sir J. Hawkins, it may not be thought amiss by some readers, for us to add one or two little extracts from their directions how to fish for Barbel, as they have the countenance of those who are fond of the amusement of angling, and are, we are persuaded, superior to any thing we could offer on that subject.

PLATE XXIX.

"The Barbel," says Walton, "affords an angler choice sport, being a lusty and cunning fish; so lusty and cunning as to endanger the breaking of the angler's line, by running his head forcibly towards any covert, or hole, or bank, and then striking at the line, to break it off with his tail, as it is observed by Plutarch, in his book *De industriâ Animalium*; and also so cunning to nibble and suck off your worm close to the hook, and yet avoid letting the hook come into his mouth.

"The Barbel is also curious for his baits, that is to say, that they be clean and sweet, and have your worms well scoured, and not kept in sour and musty moss, for he is a curious feeder; but at a well-scoured lob-worm he will bite as boldly as at any bait, and especially, if a night or two before you fish for him, you shall bait the places where you intend to fish for him, with big worms cut into pieces*; and note, that none did ever over-bait the place, nor fish too early or too late for a Barbel. And the Barbel will bite also at gentles, which not being too much scoured, but green, are a choice bait for him, and so is cheese, which is not to be too hard, but kept a day or two in a wet linen cloth to make it tough: with this you may also bait the water, a day or two before you fish for the Barbel, and be much the likelier to catch store: and if the cheese were laid in clarified honey a short time before, as namely, an hour or two, you are still the likelier to catch fish: some have directed to cut the cheese into thin pieces and toast it, and then tie it on the hook with fine silk: and some advise to fish for the Barbel with sheep's tallow and soft cheese, beaten or worked into a paste, and that it is choicely good

* Instead of these graves, which are the sediment of tallow melted for making candles, cut into small pieces, is mentioned by sir J. Hawkins as an excellent ground-bait for Barbel, Gudgeons, and many other fish, if thrown in the night, before you angle.

in August, and I believe it: but doubtless the lob-worm well scoured, and the gentle not too much scoured, and cheese ordered as I have directed, are baits enough, and, I think, will serve in any month; though I shall commend any angler that tries conclusions, and is industrious to improve the art."

"Fishing for Barbel," says one of his annotators, on the contrary, "is at best but a dull recreation. They are a sullen fish, and bite but slowly. The angler drops in his bait, the bullet at the bottom of the line fixes it to one spot of the river. Tired with waiting for a bite, he generally lays down his rod, and exercising the patience of a setting-dog waits till he sees the top of the rod move; then begins a struggle between him and the fish, which he calls his sport; and that being over, he lands his prize, fresh baits his hook, and lays in for another.

"The young brood of wasps, hornets, and humble bees are reputed good baits for this fish."

A slight description of this common fish may be sufficient. It sometimes grows to the length of two or three feet in our waters; and in the Danube, were formerly, if they are not at present, taken frequently of a much larger size. After a dreadful carnage between the Turks and Austrians, on the banks of the before-mentioned river, Barbels were found in it of such a vast size, and in such numbers as to become a matter of record; and their propensity for human flesh being well known, the circumstance was attributed to the heaps of dead bodies that had been thrown into the water. The form of this fish is not inelegant; the colours vary at different periods of growth, being sometimes whitish or silvery, and olive on the back, and at others yellowish more or less tinged with a golden hue. The second

or largest spine of the dorsal fin is serrated in a very remarkable manner; beside this the fin in our specimen contains eleven rays: the pectoral fin thirteen rays: ventral eleven: anal nine; and the tail twenty-two.

CARP.

London, Published the Act directs by E.Donovan F.R.S. & J.Rivington, May 1st 1809.

PLATE 84

PLATE CX.

CYPRINUS CARPIO.

CARP.

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth without teeth: gill membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Second anterior ray of the dorsal and anal fin osseous and serrated.

CYPRINUS CARPIO: ossiculo secundo in pinna dorsi anique serrato.

CYPRINUS CARPIO: pinna ani radiis 9, cirris 4 pinnæ dorsalis radio secundo postice serrrato. *Linn. Faun. Suec.* 359. *Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. *p.* 1411. *sp.* 21.

Cyprinus cirris 4, ossiculo tertio pinnarum dorsi anique uncinulis armato. *Art. Gen.* 4. *Syn.* 3. *spec.* 25.

The Carp, originally a native only of the warmer parts of Europe, has within the space of the last three or four centuries become by degrees habituated to colder climates, and, being a fish of excellent quality,

is now very generally naturalized in most of the northern parts of the continent, and in England. This fish is commonly supposed to have been first introduced by Leonard Maseal in the year 1514, or, as others believe, and with greater probability, at an earlier period; at least it is mentioned about twenty years before that time by *Wynkyn de Worde* in the "*Boke of St. Albon's**." He speaks of it as a "dayntous fische;" and adds "there ben but fewe in Englonde, and therefore I write the easse of him." Carps were introduced into Denmark in the year 1560 by Pierre Oxe, and are completely naturalized in that country; they were also introduced into Holland and Sweden, where they are now become naturalized. In Sweden, however, it appears to be uncommon still, as several vessels sail every year from Prussia to Sweden for the purpose of conveying Carps to that country. Russia, according to Mr. Pennant, wants the Carp to this day; they, however, receive those fish from Prussia in well-boats at some seasons of the year.

This fish varies in different countries very considerably: in the milder parts of Europe they grow to a large size, but towards the north they become gradually smaller. Carps vary also both in size and flavour, according to the nature of the waters in which they reside. Those of three or four pounds are common. In some parts of Prussia they are not unusual of about ten, twelve, or fourteen pounds weight. Mr. Pennant says, on his own knowledge, he can speak of none that exceeded twenty pounds in weight; but at the same time adduces the authority of *Jovius*, that they were sometimes taken in the Lago di Como of two hundred pounds weight, and of *Rzaczynski*, who mentions others taken in the Dneister that were

* Published in 1496.

five feet in length. Carps of this enormous size must be very scarce on the continent however, since Bloch records one of thirty-two pounds weight, taken in the domains of the *Comte de Schulenbourgh*, in Saxony, as a very extraordinary example, and tells us of another taken at Dertz, upon the frontiers of Pomerania, of thirty-eight pounds weight, which from its uncommon magnitude was thought worthy of being presented to the King. It is chiefly in Austria, Prussia and Poland that the Carp is cultivated with success, and where it forms a considerable article of commerce, the traders purchasing the fish of the nobility, who derive a great revenue from the produce of their ponds.

The Carp is extremely tenacious of life, and highly prolific; they are reported to attain to the vast age of one hundred and fifty or two hundred years; that its term of life exceeds a century we have a number of well authenticated instances. Buffon says, he has seen Carps in the fosses of Pont Chartrain, which were known to be one hundred and fifty years old; and many of those introduced into the ponds at Versailles in the reign of Louis the Fourteenth were in being a short time before the revolution.

Its spawning season is in June, or, when the spring is forward, a month earlier; they breed in the usual manner, and deposit their eggs among the herbage: one female is commonly observed to be accompanied by three males. These fish live chiefly on aquatic insects, worms, and plants, and during the spawning time swim in troops.

The dorsal fin in the specimen selected for our figure contains twenty-three rays, pectoral fin ten, ventral seven, anal seven, and the tail nineteen.

TENCH.

85

London, Publd. as the Act directs, by T. Donovan, 31 Bucklersbury, Oct. 1st 1807.

PLATE 85

PLATE CXIII.

CYPRINUS TINCA.

TENCH.

**** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth without teeth: gill membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Scales small: fins thick.

Cyprinus Tinca: squamis parvis, pinnis crassis. *Bloch. Fisch. Deutschl.* 1. *p.* 83. *n.* 14.

Cyprinus Tinca: pinna ani radiis 25, cauda integra, corpore mucoso, cirris 2. *Linn. Fn. Suec.* 263.—*Müll. Zool. Dan. p.* 50. *n.* 428.—*Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. *p.* 1413. *sp.* 25.

Brama pinnis circinatis et cauda atris, &c. *Klein. miss. pisc.* 5. *p.* 63.

Tinca. *Rondel. pisc.* 2. *p.* 157.—*Gesn. aq. p.* 984.—*Johnst. pisc. p.* 646.—*Will. Ichth. p.* 251. *t.* 5.—*Marg. Danub. p.* 47. *t.* 15.

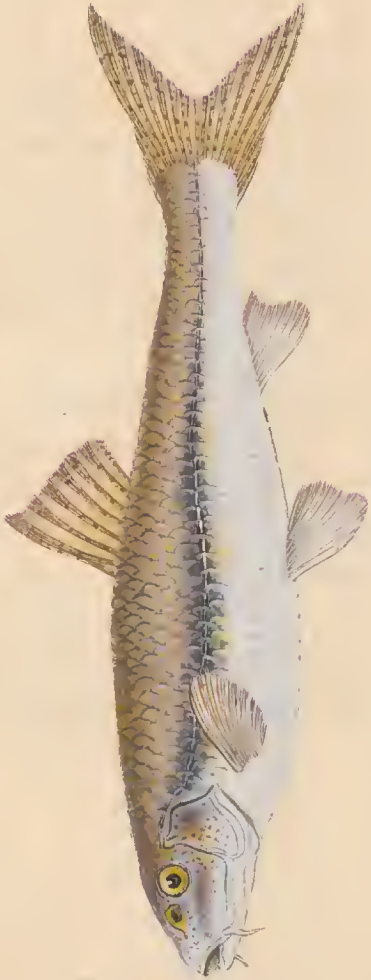
Tench. *Brit. Zool.* 3. *p.* 306. *n.* 3.

PLATE CXIII.

The Tench is esteemed a silly fish, and one that may be taken without difficulty. It is found in most lakes and rivers, but seems to prefer tranquil waters in retired situations.

As an article of food, the Tench is not uniformly approved; for although in England it has many admirers, it is considered as an insipid and worthless fish, if not unwholesome, in some other countries. M. de Bergen believes the Tench sleeps during the winter, and is revived again in spring by the genial warmth of the sun. In the month of June they seek the herbage in the shallow parts of the water to deposit their eggs.

The general colour is olive or olivaceous brown, variable in different fishes according to the season of the year. When in high perfection the back is olive, the head and sides green glossed with yellow, and the whole partaking of a fine gilded hue, as the center of every scale is of a golden colour. The fins greenish, dusky, and reddish at the base; the eyes fine red. The Tench is particularly distinguished from the minuteness of its scales. The dorsal fin contains ten rays: pectoral fin twelve rays: ventral fin nine rays: anal fin eight rays: and the tail twenty-four.



London, Pub.d 1st Mr. 1865 by R. Bateman & C.o & J. Rivington &c.'s.

PLATE 86

PLATE LXXI.

CYPRINUS GOBIO.

GUDGEON.

***** *PISCES ABDOMINALES:*

GENERIC CHARACTER.

Mouth without teeth: gill membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with eleven rays: beards two.

Cyprinus Gobio: pinna ani radius 2. cirris 2. *Linn. Mus. Ad. Fr.* 2. *p.* 107.—*Gmel. Syst. Nat. T.* 1. *p.* 3. *p.* 1412. *sp.* 3.

Cyprinus maculosus, cauda bifurcata, cirro utrinque unico ad angulos oris. *Gron. Mus.* 2. *p.* 2. *n.* 149. *Zooph.* 1. *p.* 104.

Cyprinus oblongus variis cirris 2 ad angulum oris. *Bloch. Fisch. Deutschl.* 1. *p.* 57. *n.* 11. *t.* 8. *f.* 2.

PLATE LXXI.

GOBIUS FLUVIATILIS, *Will. Ichth. p.* 264. *t.* 2. 8. *f.* 4.—*Gesn. aq. p.* 399.

GUDGEON *Raj. Pisc. p.* 123.—*Brit. Zool. p.* 308. *n.* 4.

The Gudgeon is found in most streams, rivers, and pools of fresh water in England, and in similar situations in all the northern countries of Europe. During the heat of the summer, they haunt the shallows of lakes, and gentle streams; but in the autumn, and during winter, they lie together in shoals in the deepest parts of the water. As spring approaches they again desert the lakes and streams to pass up the great rivers that flow into them, where they assemble to deposit their spawn against stones, or in other places of security.

The female of this species is a full month in spawning, depositing her eggs, a few at a time, during the whole of that period, or even longer. The eggs are of a clear blueish colour and extremely small: those eggs are eagerly sought after by the trout, by perch, carp, and tench, and other fresh water fishes. This circumstance has suggested a hint as to the propriety of introducing Gudgeons into gentlemens' fish-ponds, where any of the before-mentioned species are kept, as being the best means of supplying them with an excellent and, nutritious food; and, when we consider the amazing fertility of the Gudgeon, no doubt with an abundance of it.

This fish subsists on plants, worms, and the fry of other fishes. It is a species remarkable for the elegance of its form; and many of its varieties are beautiful. The season of the year, the quality of the

waters they inhabit, their food, and age, have each a considerable influence upon the colours of this fish, and will easily account for the variations we so frequently observe in different individuals of this species.

The Gudgeon is a fish that seldom increases to a large size. None of the continental writers speak of its being found above eight inches in length. Pennant remarks, that the few which are caught in the *Kennet* and *Cole* are three times the weight of those found elsewhere. The largest he ever heard of, was taken near Uxbridge, and weighed half a pound. The flesh of the Gudgeon is white, of a delicious flavour, and so easy of digestion, as to be strongly recommended to sick persons. The voracity of this fish is known to every angler: it bites greedily, and may be more readily caught than many other fishes. Even by raking the bed of the rivers where they inhabit, the Gudgeons may be enticed to the spot in shoals, for they resort thither in quest of the worms turned up, and by repeating this about every quarter of an hour, the shoals will be successively encreased so greatly, that they may be caught in any numbers. The offal of animals, or bullock's brains thrown into the water, will produce the same effect. Marsigli speaks of its fondness for human flesh: he observes, that during the wars between the Austrians and the Turks some years ago, when several battles were fought on the banks of the Danube, and the mangled remains of both men and horses were thrown into the river, the Gudgeons devoured the former with voracity, but would not eat the horse flesh.

In the dorsal fin of the specimen figured in our plate there are eight rays; pectoral fin fourteen: ventral eight: anal eleven; and in the tail twenty-one.

CHUB.

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PLATE CXV.

CYPRINUS JESES.

CHUB.

*** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth without teeth: gill-membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body and head thick: snout roundiſh: about ten rays in the anal fin.

CYPRINUS JESES: corpore et capite crasso, rostro rotundato, pinna ani radiis 14. *Bloch. Fisch. Deutschl.* 1. *p.* 45. *n.* 6. *t.* 6.

CYPRINUS JESES: pinna ani radiis 14, rostro rotundato. *Gmel. Linn. Syſt. Nat. T. I. p.* 3. *p.* 1314. *sp.* 20.

Cephalus fluviatilis. *Rondel. pisc.* 2. *p.* 190.

CHUB. *Penn. Brit. Zool. V.* 3. *p.* 368. *sp.* 175.

The Chub is an inhabitant of Europe, and is a species of the freſh-water kind, in some measure peculiar to large rivers, where it

lies in holes and the most retired places: it is of a shy and timid nature, and subsists on worms and insects. The spawning season is in May.

This is a fish of no esteem for the table, being coarse and full of bones; it grows only to a moderate size, a Chub of four or five pounds weight being very unusual. The colours vary a little accord- to the season of the year.

In the specimen represented in the annexed plate the dorsal fin contains nine rays: pectoral twelve: ventral eight: anal ten: and caudal eighteen.

DACE.

London, Pub.d as the Act directs by A. Donovan, F.L.S. Rivington, Jan.y 1, 1804.

PLATE 88

PLATE LXXVII.

CYPRINUS LEUCISCUS.

DACE.

* *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth ſmall and without teeth: gill membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with eleven rays: dorsal fin ten.

Cyprinus Leuciscus: pinna ani radiis 11, et 10 in pinna dorsali. *Bloch, Fisch. Deutschl.* 3. *p.* 141. *n.* 28. *t.* 97. *f.* 1.

Cyprinus Leuciscus: pinna ani radiis 10, dorsali 9. *Gmel. Linn. Syst. Nat.* 1424. *sp.* 12.

Cyprinus novem digitorum, ritulo longior et angustior, pinna ani radiorum decem. *Art. syn.* 9.

Leuciscus fluviatilis secundus. *Gesn. aq. p.* 26. *ic. anim. p.* 290.

Vandoise, or Dard. *Belon, Bloch, &c.*

Dace, or Dare. *Will. ichth. p.* 260. *Ray, pisc. p.* 121. *Penn. Brit. Zool. V.* 3. *p.* 366.

PLATE LXXVII.

The Dace delights in clear streams, or in deep and still rivers, where it subsists chiefly on worms. In summer it is remarkable lively, and is frequently observed sporting near the surface of the water. The Dace is the prey of all the larger and more voracious fishes that inhabit fresh waters; but the perch and jack are its greatest enemies. This is a prolific fish, multiplying prodigiously: the spawning time is in June, when it deposits its eggs at the roots of aquatic plants, under stones, or in the gravelly beds of rivers. Although the flesh of the Dace is palatable and wholesome, it is held in very little esteem.

The ordinary size of this fish seldom exceeds four, five, or six inches, those of eight or ten inches are uncommon. In France they are sometimes found a foot in length; and Bloch informs us, it has been taken in England eighteen inches in length, but on what authority we are not informed. Pennant speaks of one that weighed a pound and a half. The largest we have seen were caught in the river Thames, and did not exceed the length of twelve inches.

This elegant species of Cyprinus appears abundantly common in the early part of the summer in many of the English rivers. We suspect it to be less plentiful on the Continent than with us, except in France, and the southern parts of Germany. It occurs also in Siberia.

In our specimen the pectoral fin contains eighteen rays: ventral nine rays: and tail twenty-two rays.

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London Publ. as the Act directs by F. & C. Rivington, Aug.1,1804

PLATE 89

PLATE LX.

CYPRINUS PHOXINUS.

MINOW.

* *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth without teeth: gill-membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with eight rays: upon the tail a dusky spot: body pellucid.

CYPRINUS PHOXINUS: pinna ani radiis 8, macula fusca ad caudam, corpore pellucido. *Müll. prodr. Zool. dan. p.* 50. *n.* 430.—*Gmel. Linn. Syst. Nat. p.* 1422. *sp.* 10.

CYPRINUS PHOXINUS. *Bloch Fisch. Deutschl.* 1. *p.* 6. *n.* 12. *t.* 8. *f.* 5.

Minow. *Ray Pisc. p.* 125.

Penn. Brit. Zool. 3. *p.* 318. *n.* 11.

PLATE LX.

This pretty little fish is frequent in many of our fresh water streams that flow over a gravelly bottom, during the summer; keeping together in large shoals, and swimming very near the surface of the water. Old Walton tells us that the Minow, or Penk, (Pink) is not easily found and caught till March, or April, for then it appears first in the river, nature having taught it to shelter and hide itself in the winter time in ditches near the river, both for the sake of security, and to keep itself warm in the mud, or amongst the weeds.

"The Minow (says this writer in another place) hath, when he is in perfect season, and not sick, which is only presently after spawning, a kind of dappled or waved colour, like to a panther, on his sides, inclining to greenish and sky colour, his belly being milk white, and his back almost black, or blackish. He is a sharp biter at a small worm, and in hot weather makes excellent sport for young anglers, or boys, or women that love that recreation, and in the spring they make of them excellent minow-tansies; for being washed well in salt, and their head and tails cut off, and their guts taken out, and not washed after, they prove excellent for that use; that is, being fried with yolks of eggs, the flowers of cowslips, and of primroses, and a little tansy; thus used, they make a dainty dish of meat."

In a note likewise under the history of the Perch, in the last edition of the Complete Angler, we are told, that the largest perch are taken with a minow, hooked with a good hold through the back-fin, or rather through the upper-lip, as the perch, from the structure of his mouth, cannot take the bait cross-wise like the pike. The Minow is well known to be an excellent bait for the latter fish also, and likewise for the trout, both which fishes, together with the perch, are the greatest enemies of the Minow.

PLATE LX.

The Minow feeds on aquatic plants and worms, and is remarkably prolific. It is a small kind, scarcely ever exceeding the length of three or four inches. Both sexes are represented in the annexed Plate. In point of number, the rays in the fins nearly accord in both. The dorsal fin contains eight rays: pectoral ten rays: ventral seven rays: anal eight: and the caudal, nineteen.

ROACH.

90

London, Published as the Act directs by E. Donovan, F.L.S. & C. Rivington, No. 1, 1809.

PLATE 90

PLATE LXVII.

CYPRINUS RITULUS.

ROACH.

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth without teeth: gill membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Anal fin with twelve rays, reddish.

Cyprinus Ritulus: pinna ani radiis 12, rubicunda. *Linn. Fn. Sv.* 372.—*Gmel. Syst. Nat. T.* 1. *p.* 1426. *sp.* 16.

Cyprinus iride pinnis ventris ac ani plerumque rubentibus. *Art. Gen.* 3. *syn.* 10. *sp.* 10.

Cyprinus Ritulus. *Bloch Fisch. Deutschl.* 1. *p.* 32. *n.* 2. *t.* 2.

Ritulus. f. Rubellus fluviatilis. *Will. icht. p.* 262.—*Jonst. pisc. p.* 130.

Roach. *Penn. Brit. Zool. v.* 3. *p.* 311. *n.* 7.

PLATE LXVII.

The Roach is abundant in almost every river throughout the temperate parts of Europe. It is a fish that is known to delight in clear and deep waters in the most retired situations, and in particular prefers those still waters that have a sandy, or gravelly bottom.

In the river Thames the finest Roach are caught about the middle of May, or early in June, when those fish come up in shoals from the sea to deposit their spawn in the higher parts of the river. At that season we have obtained them from the Thames fishermen of a large size and in excellent perfection for the table. Bloch, treating on the Roach found in Prussia, observes, that it seldom attains in that country to a large size, its greatest weight not exceeding a pound, or a pound and a half. We have Roach in England much larger than this. Sir John Hawkins, in his annotations on old Walton the angler, remarks, that on the 15th of September 1754, he caught a Roach at Hampton that measured fourteen inches and an eighth from the eye to the fork, and in weight wanted but an ounce of two pounds; and this even, though of a vast size, proves inconsiderable compared with the largest recorded by Mr. Pennant, the weight of which was five pounds *.

This fish subsists on herbs, worms, &c. The eggs are greenish, and become red by boiling. The dorsal fin in the specimen we have figured contains ten rays: pectoral thirteen: ventral nine: anal twelve; and caudal twenty-two.

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* "In a list of fish sold in the London markets, with the greatest weight of each, communicated to us by an intelligent fishmonger, is mentioned one whose weight was five pounds." *Penn. Brit. Zool. T. 3. p. 366.*

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RED EYE.

London, Published as the Act directs by S. Jonsson & F. & C. Rivington, Oct. 1, 180

PLATE 91

PLATE XL.

CYPRINUS ERYTHROPTHALMUS.

RED EYE.

ABDOMINALES.

GENERIC CHARACTER.

Mouth without teeth: gill-membrane with three rays: body smooth, and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body deep: iride orange; ventral, anal fins, and tail red.

CYPRINUS ERYTHROPTHALMUS: latus, iride crocea, pinnis ventralibus anali caudaque cinnabarinis.

CYPRIMUS ERYTHROPTHALMUS pinna ani radiis 15, pinnis rubris. *Linn. Fn. Suec.* 366.—*Gmel. Linn. Syst.* 1429. *sp.* 19.

This is certainly the Rud of Pennant, (No. 170), which he says is found in the Charwell, near Oxford; in the Witham in Lincolnshire,

and in the fens in Holderness. The same author conjectures that it may be the *Shallow* of the *Cam*.

Linnæus having described *Cyprinus Orfus* as an inhabitant of our fresh waters, without speaking of the other species, *Erythropthalmus*, as a British fish, the two kinds have been erroneously confounded together as one species, by some writers in this country. Bloch takes occasion to comment upon the foregoing remark of Linnæus, in his history of fishes, when describing his *Orphe* "Linne," he tells us, "dit que ce poisson se tient dans le Rhin, *et dans les rivieres de l'Angleterre*. Mais je doute qu'on le trouve ni dans l'un, ni dans les autres." Another passage in the same description deserves also notice, "Quand Willugh. demande si notre Orphe est le même poisson que le rud des Anglais, il faut lui repondre négativement; car ce denier est le rotengle *.

This is a remarkably common fish in many countries of Europe: it is extremely prolific; spawns early in the spring; feeds on aquatic plants, worms, and insects, and seldom grows to the length of more than twelve or fourteen inches: as a British fish, it seems to be most plentiful in the rivers in the north of England, or in Scotland. The back is of a dark colour, blending into greenish till it approaches near the lateral line, below which the sides are bright and silvery, glossed very faintly with yellow: the colour of the iride is remarkable, as is also the brilliant red of the fins, which form a striking contrast to the delicate tints of the belly. The Linnæan specific character, which, beside noticing the colour of the fins, is taken

* Meaning Cyprinus Erythropthalmus.

from the number of rays in the anal fin, is not to be depended on; in our specimen, for example, there are only twelve rays instead of fifteen. The dorsal fin has eleven rays: pectoral fin nineteen: caudal twenty.

BLEAK.

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PLATE XVIII.

CYPRINUS ALBURNUS.

BLEAK.

GENERIC CHARACTER.

Mouth without teeth: branchiostegous membrane with three rays. Body smooth, whitish: ventral fins in general with nine rays.

SPECIFIC CHARACTER.

Twenty rays in the anal fin.

CYPRINUS ALBURNUS pinna ani radiis 20. *Fn. Suec.* 377.—*Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. *p.* 1434. *sp.* 24.

Leuciscus dorso ex viridi fusco, &c. *Klein. miss. pisc.* 5. *p.* 68. *n.* 16. *t.* 18. *f.* 3.

Albule. *Gesn. Thierb. p.* 159.

BLEAK. *Will. Icth.* 263.—*Raii. Syn. pisc.* 123.—*Penn. Brit. Zool. T.* 3. *p.* 370. 176.

The Bleak is a very abundant fish in many of our rivers, and in those of the north of Europe in general. The form is elegant, and the colours brilliant: the flesh is in some esteem, but it is chiefly taken for the sake of the beautiful silvery scales, which artists make use of in the manufactory of artificial pearl.

PLATE XVIII.

The credit of this invention is claimed by the French; and it is said they have arrived at such a degree of perfection in the art, that independant of the plain silvery hue of the beads in common, they can vary the colour to blue, green, or any other vivid tint they may desire. The process is very short; the scales are scraped off, washed, and then reduced to a fine powder; this is diluted with water, and introduced into a thin bubble of glass, where it forms an internal coating: the cavity is then filled with wax, through which a hole is bored, and the bead is finished.

Gmelin speaks of this species as being from four to ten inches in length: in the river Thames, about Battersea, or still higher up the country, they are sometimes taken full eight inches in length; but the common size scarcely exceeds five or six inches at most.

At certain times in the summer, the Bleak is infested with a creature of the Vermes tribe, which hastily increasing in size, very often destroys it. Fishes so infested rise to the surface of the water, where they leap and tumble about in the greatest agonies, and in that state are well known to the fishermen by the name of Mad Bleaks. Upon opening them at this season, there is always found one, and sometimes more of these worms, in the intestines of each: these rapacious creatures are flattish, broad, and when extended, are oftentimes twice the length of the fish they infest.

The Bleak may be taken at any season of the year with a hook and line. It is distinguished from every other species of the Cyprinus genus by the superior length of the under jaw. The time of spawning is in May, June, and July.

PLATE XVIII.

There is a small fish of this genus that appears in immense numbers during the month of July, in the Thames, near Blackwall and Greenwich, where it is well known by the name of White Bait; and it is believed to be nothing more than the fry of this species.

BREAM.

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PLATE XCIII.

CYPRINUS BRAMA.

BREAM.

**** PISCES ABDOMINALES.*

GENERIC CHARACTER.

Mouth without teeth: gill-membrane with three rays: body smooth and whitish in general: ventral fins usually with nine rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body broad, with the back arched: anal fin about twenty nine rayed, and with the other fins fuscous.

CYPRINUS BRAMA: latus dorso arcuato, pinnis fuscis: anali radiis sub. 29.

CYPRINUS BRAMA: pinna ani radiis 27. pinnis fuscis. *Linn. Fn. Succ.* 360.—*Gmel. Linn. Syst. nat.* 1436. *n.* 27.

CYPRINUS pinnis omnibus nigrescentibus, pinna ani ossiculorum 27. *Art. gen.* 6. *syn.* 4. *sp.* 22.

Brama primo radio pinnæ 5 dorsalis simplici &c. *Klein. miss. pisc.* 5. *p.* 61. *n.* 1.

Brachsen, *Gesner, Meyer, &c.*

BREAM. *Penn. Brit. Zool.*

PLATE XCIII.

This fish is found in great lakes and in the deeper parts of still, or gently flowing streams. Their food consists of herbs, moist earth, and worms, which they find at the bottom of the water. The spawning season is in May, or as early as the end of September, when the weather is warm and favourable; at the commencement of the spawning season they ascend large rivers, and deposit their eggs, which are of a reddish colour in the most secure places among the plants that grow in the water.

The Bream is a fish considered in England as insipid, and of little consequence. On the continent however, especially in the territories of the King of Prussia; in the states of Holstein, Mecklenburgh, Livonia, and in Sweden, the Bream is held in high repute. They abound in the lakes of those countries, the fisheries of which are rented at a high price. The flesh of this fish is white and not ill flavoured. It is observed to live to a great age, and to attain to a considerable size, growing commonly to the length of a foot or eighteen inches, and sometimes even to between two and three feet. Those of twelve or fourteen pounds weight are preferred for the table.

It is easily distinguished by the great breadth and proportionate lateral compression of the body: the head is small; the back is remarkably arched, and the fins somewhat falcated and dusky; the lateral line placed very low and waved irregularly. The colours of this fish while living and in the water are beautiful, the upper parts partaking of all the various hues of green and olive, changeable to purple, and golden yellow, and as it descends towards the lateral line becoming of the purest silver, which latter pervades the whole of the lower parts of the fish. The brilliancy of those colours are evanescent in the extreme, vanishing as the creature dies, the purple fading, and the

green changing to a dusky colour glossed with silvery blue. The former hues may be revived in some measure several hours after the fish dies by moistening it with fresh water. The fishermen assert that when the Breams ascend rivers they are collected into small shoals, each of which is preceded by a leader who directs the course of the shoal and differs in appearance from the rest. This is called by our fishermen the "Queen bream," and by the French "*Chef de brêmes.*" This kind of Bream is particularly described by Bloch, the one he examined was thirteen inches long, and differed in the following particulars from the common breams, the eye was large, and the iris blueish: the head, and bottom of the fins of a fine red purple, the last bordered with a reddish band: the scales were smaller and thicker: the body also was marked with several red spots of an irregular form, and was covered with a viscous matter. It is conjectured this may be a cross breed between the Cyprinus Erythrophtalmus and the Bream. In the spring the Bream is sometimes found with a number of minute whitish tubercles on the body, the effect of some malady to which this fish is liable.

The number of rays in the anal fin are by no means sufficiently constant as to afford us a criterion of the species, they are usually about twenty seven in number but are not so uniformly. In the dorsal fin of one specimen we examined are twelve rays; in the pectoral fin eleven rays: in the ventral fin eight rays, and the tail twenty two.

STELLATED GLOBE-FISH.

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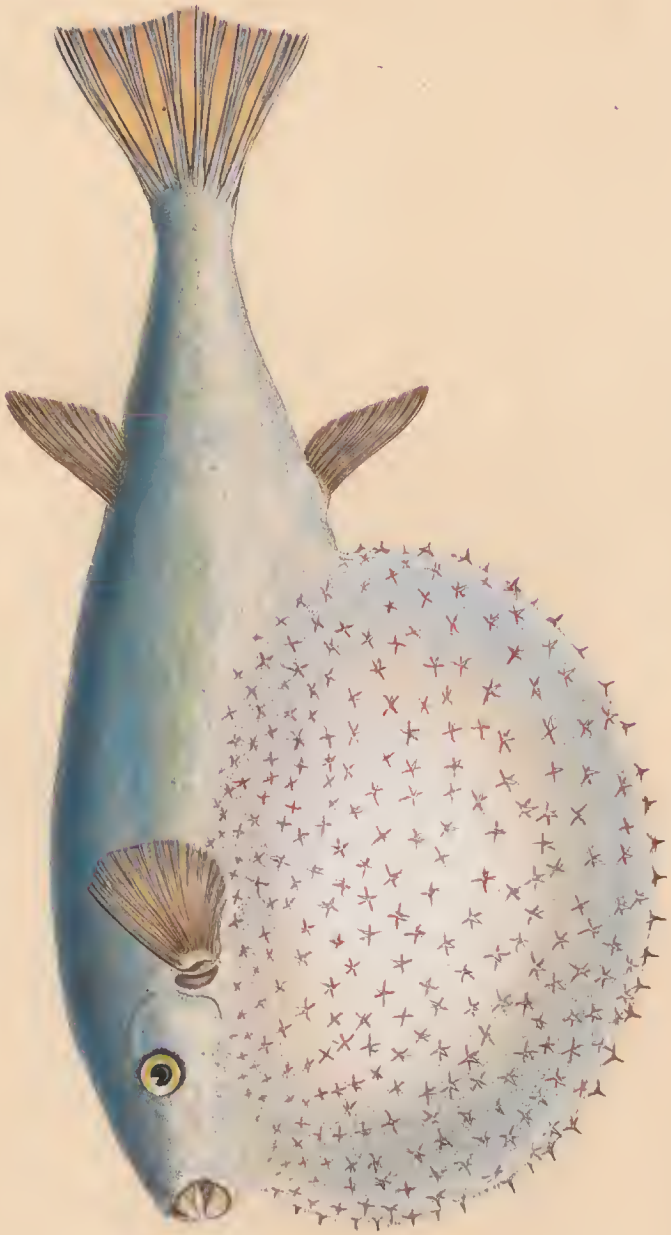

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PLATE LXVI.

TETRODON STELLATUS.

STELLATED GLOBE-FISH.

**** *PISCES BRACHIOSTEGI.*

GENERIC CHARACTER.

Jaws bony, extending, divided at the tip: aperture of the gills linear: body muricated beneath: no ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body above blue, beneath silvery: abdomen spinous, each spine arising from a stellated root, of four rays.

TETRODON STELLATUS: supra cœruleus subtus argenteus, abdomine aculeato: aculeorum radicibus stellatis quadri-radiatis.

Globe Diodon. *Penn. Brit. Zool. v.* 3, *p.* 132. *sp.* 56.

The stellated Globe-fish, is one of the most singular creatures of the finny tribe hitherto detected in the British seas. A fish of this curious kind is described by Pennant in the British Zoology as a

species common to Europe, and South Carolina. "As yet," observes Mr. Pennant, "only a single specimen has been discovered in our seas; taken at Penzance in Cornwall." To this we may add another instance within our more immediate knowledge, of its being captured in the British seas: about the year 1779, some short time after the publication of the British Zoology, a very fine fish of this sort was caught on the Cornish coast, and communicated to Mr. George Humphrey, of Saville House, Leicester Square. This specimen was afterwards obtained by Mr. John Hunter, Surgeon, in whose Museum the fish, very finely preserved in spirits, remains at this time *. It is about eighteen inches in length, and when first taken was remarkable for the uncommon brilliancy of its colours according to the testimony of those who saw it at that time: the back was of the finest ultramarine blue imaginable, the whole under surface of a resplendent silver, and the belly beset with spines of a rich carmine colour, which seemed to derive still greater beauty from the admirable contrast of the silvery surface upon which they were disposed. We are in possession of a third specimen that has been caught in the European seas, that exactly corresponds with the above, but we have not hitherto been so fortunate as to obtain a British specimen.

After perusing the description which Mr. Pennant leaves us of this fish, we must really confess our astonishment, that any ichthyologist could possibly remain in doubt as to the identity of the species that author means by his Globe Diodon. Mr. Pennant, it is true, considers his fish as the Tetrodon lævigatus of Linnæus, in which respect he is mistaken, but in other particulars his description of the

* This fish has the abdomen cut open to shew the structure of the internal organs, by means of which the creature has the power of inflating the external skin of the abdomen at pleasure, like a bladder, to a prodigious size.

fish is pretty accurate, and may be generally relied upon. In stating this we dissent entirely from the opinion entertained by another naturalist of no mean celebrity in the science of ichthyology, the ingenious Dr. Bloch of Berlin. This writer treats the account given by our English naturalist with unmerited severity. He dwells on the subject of the *Globe Diodon* with much critical animadversion, and labours to prove that the fish Mr. Pennant means, is not the Tetrodon lævigatus of Linnæus, but the Linnæan Tetrodon Lagocephalus; but with what success we shall consider hereafter. His remarks on this topic are curious, and cannot be better expressed than in his own words. " M. Pennant (says that writer) rapporte à not repoisson le lævigatus de Linné ; mais en comparant son dessein avec la description que Linné donne de ces deux poissons, on voit que son poisson est le notre, ou le lagocephalus de Linné ; car chez le lævigatus, il n'y a que la partie ánterieure du ventre qui soit garnie de pointes. Il lui donne aussi deux dents au lieu de quatre *."

But it appears from hence that Dr. Bloch has presumed too far. He even affords us reason to suspect, from this and various other passages in his work, that he has ventured to criticise upon the observations of a writer whose language he was at best but imper-

* In the latter part of this observation Dr. Bloch is right; the jaws and teeth are far from well expressed in Pennant's plate, a circumstance that may have arisen from an oversight in the artist, as well as the author. In all the specimens of this fish that we have seen, the beak is cleft at the apex, both of the upper and lower mandible, and by that means each is divided into two distinct teeth, but in Pennant's figure, the mandibles appear entire, as if the fish were furnished with only a single tooth instead of two in each jaw. This cleft being one of the principal characteristics of the genus Tetrodon, must have been evidently overlooked by Mr. Pennant.

fectly acquainted with. We cannot otherwise account for his misconception of almost every characteristic by which Pennant distinguishes his fish: and which he must have misconceived, or entirely overlooked when he concluded so positively that fish, and his lagocephalus were the same species. To the eye of an experienced naturalist nothing can appear more dissimilar than the Lagocephalus of Bloch, and the Globe Diodon of Pennant. There is one remark of the latter writer especially, that ought to be observed; and which, if it had not escaped the notice of Bloch, must have convinced him he was himself mistaken as to Pennant's fish:—when speaking of the abdominal spines of the Globe Diodon, this writer tells us, in language the most decisive, that the belly of his fish "was beset with innumerable small sharp spines adhering to the skin by *four processes**." How then could Bloch conceive his Lagocephalus to be the same fish, when he as plainly informs us, the spines in his fish adhere to the skin by means of *three processes* instead of four?—"Les etoiles (says he) sont disposées en vingt lignes à demi-cercles: chacune est formée d'un piquant-qui est posé sur trois racines," and yet this ingenious ichthyologist, overlooking such a striking specifical distinction of the two species, concludes that the Pennantian fish must be his Lagocephalus!—Dr. Shaw has inadvertently adopted this erroneous conclusion, apparently from Bloch, in his General Zoology, and at the same time encreases the confusion, by blending in detail, the history and description of the true Lagocephalus, with the remarks of Pennant on the Globe Diodon.

By attending to the diverging processes at the base of the abdominal spines, the two species above confounded may be easily dis-

* Penn. Brit. Zool. v. 3, p. 132.

criminated from each other, without regarding other particulars in which they also differ materially. At the present time we have before us the Tetrodon lævigatus of Linnæus which Pennant mistakes, the Lagocephalus of Linnæus and Bloch, and the Pennantian Globe Diodon, all which are so obviously distinct from each other, that we cannot hesitate in pronouncing them to be three distinct species. A few observations on each of these will not be deemed inapplicable to the subject under consideration.

Lævigatus approaches nearer to our fish than the species Lagocephalus: its colours are the same, blue above, and silvery beneath, but in this the abdominal spines are rather recurvate, and arise from an oblique trifurcated root: they are small, numerous, and situated, as Linnæus observes, towards the anterior part of the abdomen. Our fish resembles this, but has the whole surface of the abdomen, down to the vent, armed with spines, instead of the anterior part only: those spines are fewer in number than in the former fish, of a much more conspicuous size, and arise from a distinct stellated root of four processes instead of three; nor is the spine oblique as in the preceding fish, but perfectly erect *. Lagocephalus is so remote from the preceding, that a slight description, it is conceived, will be sufficient to distinguish it. Instead of blue, the back is of a yellowish, or testaceous brown, the sides brown instead of silvery,

* That this may not be conceived to arise from accident, or be observable only in a single specimen, it will be proper to observe, that the appearance of the spines, and their quadrifurcated roots, is precisely the same in two specimens of this fish in our own collection, that differ materially in point of size; and we have also seen three others exactly corresponding in this particular.

and the back and sides marked with conspicuous stripes and spots of black; the abdominal spines are small, inclining, and diverging at the base into three rays.

From the above remarks it will be obvious that a considerable degree of confusion has heretofore prevailed respecting the beforementioned fishes. The Globe fish of our seas has not been explicitly described by any author, with the exception of Pennant: and it may be even doubted whether any other author has hitherto observed it. To obviate further error, we therefore wish to name it Tetrodon Stellatus, the Stellated Globe-fish, Mr. Pennant not having given it any Latin specific name; and that of *Globe Diodon*, the English one adopted by him being inadmissible, for it is a Tetrodon, and not a Diodon of Linnæus.

The dorsal fin in the specimen figured in the annexed plate contains eleven rays: pectoral fourteen; anal ten; and caudal six.

SUN FISH.

2595

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PLATE 95

THE

NATURAL HISTORY

OF

BRITISH FISHES.

PLATE XXV.

TETRODON MOLA.

SUN FISH.

BRANCHIOSTEGI.

GENERIC CHARACTER.

Jaws bony, advanced, divided at the tip: aperture of the gills linear: body beneath muricated: no ventral fins.

SPECIFIC CHARACTER.

Unarmed, rough, compressed, round: tail very short, rounded, and connected with the dorsal and anal fin: spiracles oval.

TETRODON MOLA: inermis, asper, compressus, rotundatus, cauda brevissima rotundata, pinna dorsali analique annexa, spiraculis ovalibus. *Retz. Nov. Act. Stockh.* 6. 2. 3. *p.* 111. *t.* 4.

PLATE XXV.

Mola Salviani, *Orthragoriscus*, Rondel. Sun-fish, *Willughby*. 1. *t.* 26.

Tetrodon lævis, compressus, cauda truncata: pinna brevissima, dorsali analique annexa. *Syst. Nat.* 12. *p.* 411. *n.* 7. *Gmelin. Syst. Nat.* 1447. *sp.* 7.

Sun Fish from Loo. *Borlase Cornwall*, 267. *tab.* 26. *fig.* 6.

Short Diodon, *Penn. Brit. Zool.* 3. *p.* 131. 55.

In the great scale of animated nature, there are perhaps few creatures of a more extraordinary appearance than the Tetrodon Mola, or one more likely to create surprise in the mind of a cursory observer. So remarkable indeed is this appearance, that some might be inclined to doubt the positive existence of a creature so formed, and certainly at the first glance, a slight degree of scepticism in this respect is not only pardonable, but laudable. To those who are conversant with Natural History it cannot be unknown, for descriptions and figures of it have been inserted in several works on the fish tribe, and being by no means unfrequent in the Mediterranean and other European seas, the fish itself may have occurred to the notice of those who reside near the sea shore.

The Germans call this fish *Schwimmendekopf*, and the French *tête nageante*, or swimming head, a name sufficiently expressive of its appearance, which is precisely that of the head and shoulders of some larger fish cut off, and still retaining all the principles of life and vigour.

The first figure given of this fish is supposed to be that by Salvian. That of Pennant is certainly extremely bad; and another by his

predecessor, Borlase, is nothing better. That even of Bloch has in all apparent probability been copied from an uncouthly stuffed specimen, and instead of exhibiting in its colours some trace of the fine silvery hue of the belly and sides, which is so conspicuous in a recent subject, it is almost uniformly of a dirty blueish colour.

This seems not to have been a very common species on the Cornish coast in the days of Borsale; his figure was copied from one of the Drawings of Mr. Jago: at this time we find that it does appear on the Cornish coast, but not in such plenty as it haunts some shores in warmer climates. This fish grows to the enormous weight of four or five hundred pounds, and proves a valuable capture to the fishermen, when taken, on account of the oil which they extract in great plenty from it: the flesh is of little value, being oily and very rank. It is not common, we believe, on any of our coasts: one that was seen in the Bristol channel about four years ago was deemed a great rarity.

Our figure is copied from an elegant little specimen, which we were assured had been caught near the coast of Brighton. Its form, as represented, is nearly orbicular, and the skin rough with little pustules: in the dorsal fin are thirteen rays: anal sixteen: pectoral twelve: caudal fourteen.

Gmelin with great impropriety makes the oblong Sun Fish of Pennant a variety of this species.

TRUNCATED SUN FISH.

London, Publd as the Act directs by E. Donovan & Nat. Harrington, Nov.r 1, 1803

PLATE 96

PLATE XLI.

TETRODON TRUNCATUS.

TRUNCATED SUN-FISH.

* *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Jaws bony, advanced, divided at the tip: aperture of the gills linear: body beneath muricated: no ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Unarmed, smooth, compressed, oblong and truncated: tail very small, and connected with the dorsal and anal fin.

TETRODON TRUNCATUS: inermis lævis, compressus, oblongus truncatus cauda brevissima pinna dorsali analique annexa. *Gmel. Linn. Syst. Nat.* 1448. *sp.* 7.

TETRODON MOLA, truncatus (β)—T. inermis, lævis, compressus, oblongus, cauda brevissima, pinna dorsali analique annexa, spiraculis lunatis. *Retzius Nov. act. Stockh.* 6. 2. *p.* 116.

PLATE XLI.

Sun-fish from Mount's-Bay. *Borlase Cornwall.* 268. *tab.* 26. *f.* 7.
Oblong Sun-fish. *Penn. Brit. Zool. V.* 3. *p.* 100. *n.* 1.

Dr. Borlase appears to be the first, and almost only English writer, who has seen and described this fish. In his Natural History of Cornwall, he speaks of it under the title of the Sun-fish from Mount's Bay, and mentions one that was taken at Plymouth in 1734, that weighed five hundred pounds. Whether Mr. Pennant ever had an opportunity of inspecting this species is uncertain; the figure given of it in the British Zoology, as well as that of the Short Diodon, Tetrodon Mola, is certainly an indifferent copy from the plate of Borlase.

The principal fishery for the short Sun-fish, is carried on upon the Western coasts, those of Cornwall in particular, where the oblong or truncated Sun-fish is sometimes found in company with the other sort. There are instances of the truncated Sun-fish being caught of an enormous size upon that coast. We have once seen the dried skin of this species, the animal of which, when living, weighed between two and three hundred pounds. Our figure is taken from a small specimen, obtained in a recent state, in one of our fishing excursions on the Bristol channel. The dorsal fin in this, contains twelve rays: pectoral fourteen: anal fifteen, and tail seventeen. This fish subsists on worms of the testaceous and other tribes, small crabs, &c. fragments of these being found on dissection in the stomach.

The truncated Sun-fish is described by the judicious Borlase as being altogether distinct from the other kind; and Mr. Pennant is to

be commended for having adhered to the opinion of that writer in the British Zoology. We are only surprised that Gmelin, or any other Naturalist, after inspecting the two kinds, or even attending to the remarks of Borlase, could for a moment believe them to be the same. In the last edition of the Linnæan Systema Naturæ, this species stands however as a variety of the short Sun-fish, *truncatus* β *Tetrodon Mola*. Bloch does seem to be acquainted with this truncated species: the short Sun-fish is described by that writer.

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SHORTER PIPE FISH.

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PLATE LVI.

SYNGNATHUS TYPHLE.

***** *PISCES BRANCHIOSTEGI.*

SHORTER PIPE-FISH.

GENERIC CHARACTER.

Head small. Snout sub-cylindrical, long, turned up at the apex. Mouth terminal, without teeth or tongue, and furnished with a lid. Lower jaw moveable. Gill-covers large, striated, and closed or shut up. Spiracle on the nape tubular, the opening small. Body articulated with many sided scales. No ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Caudal and pectoral fins radiated: anal fin small; body hexagonal; abdomen somewhat carinated; snout broad and compressed.

SYNGNATHUS TYPHLE: pinnis caudæ pectoralibusque radiatis ani minima, corpore sexangulato, abdomine subcarinato, rostro lato compresso.

SYNGNATHUS TYPHLE: pinnis caudæ, ani, pectoralibusque radiatis, corpore sexangulato. *Linn. Fn. Suec.* 377.—*Gmel. Syst. Nat. t.* 1. *p.* 3. 1454. *sp.* 1.

PLATE LVI.

Syngnathus corpore medio hexagono, cauda pinnata. *Art. Gen.* 1. *Syn.* 1. *sp.* 3.

Sea-Adder. *Borl. Corn. p.* 267. *pl.* 26. *f.* 12.

Shorter Pipe-fish. *Penn. Brit. Zool. t.* 3. *p.* 140. 61.

Le Syngnathe Trompette. *Buff. de Deterville, v.* 7. *p.* 240.

The *Syngnathi* appear to be more imperfectly defined by naturalists than almost any other genera of fishes. With respect to the British species in particular, nothing can be more ambiguous. Whether we advert to the days of Ray, and Willughby, or Sibbald; to Borlase, or the late Mr. Pennant, the obscurity prevails in an equal measure. Linnæus does not escape the critical censure of Dr. Bloch for his erroneous conception of certain species, and it might be easy to prove, as well as intimate, that Bloch himself has rather increased than cleared up the confusion Linnæus created. To enter into an investigation of all the species described by Linnæus, his successor Gmelin, or by Bloch, would be irrelative to our present purpose. The French naturalists, among whom Lacepede stands most distinguished, have endeavoured to restore the arrangement of the species of this genera to lucid order, but after all there are uncertainties remaining to be overcome. Several of the species described by early writers are far from being correctly known. Nor can we be certain, in some instances, whether what are now considered as varieties, may not in reality be distinct from the species to which they are supposed to be connected; or whether among the number of those described as species, some have not been too hastily assumed, and may prove hereafter to be varieties only.

PLATE LVI.

Notwithstanding the example of the great Linnæus, there is a radical defect in presuming, that the presence or absence of any particular fin, can constitute an unerring specifical distinction of the different fishes of this genus. Nature has herself afforded other characters, that are equally perspicuous, and more constant, or at least less liable to accident. Sometimes Linnæus has paid a cursory attention to those characters, but he does not attend sufficiently to them. The fallacy of the Linnæan specific characters, will be at once seen for instance in the species Acus: should this be accidentally bereft of the anal fin it becomes *Pelagicus*; and it is only by regarding its secondary character with caution, that the error can be detected. Again, if both the pectoral and anal fin be destroyed, what criterion have we to distinguish it from *Æquoreus?* Ophidion affords another example of the same nature: when recent, the body is round and smooth, but when dry, appears slightly hexagonal, and in this state, scarcely differs from the Linnæan species Barbarus; the pectoral fins are then the principal distinction, and if these be broken off, the Opidion will correspond with the character of that species *.

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* In treating of any genera less ambiguous than the present, Linnæus could not be considered blameable for adopting characters that might render imperfect specimens of the species he describes liable to misconception. But when we consider the confusion likely to prevail among the Linnæan *Syngnathi*, and their *synonyms*, in consequence, we cannot avoid expressing a wish that he had attended more closely to other collateral characters. He does regard the shape of the body, but this is not sufficient. The exact structure of the snout, if taken into consideration, would have greatly assisted in determining the respective species.

The fins in all these fishes are small and delicate, and therefore apt to be frequently mutilated, and in dried specimens especially. In the figures given by old writers, we seldom find the fins correctly drawn, the fault arising perhaps from this cause, rather than from the

PLATE LVI.

Of the British Syngnathi, Mr. Pennant mentions four kinds, namely, the *Longer Pipe-Fish:* the *Shorter Pipe-Fish*, under which is comprehended the two Linnæan species, Typhle and Acus; and the *Little Pipe-Fish*. The shorter Pipe-fish is the species under consideration.

"This," says Mr. Pennant, "is shorter and thicker than the longer Pipe-fish, yet I have seen one of the length of sixteen inches. The middle of the body in some, is hexangular, in others, heptangular. Linnæus constitutes two species of them, his Syngnathus Typhle, and Syngnathus Acus, but we join with Doctor Gronovius, in thinking them only varieties of the same fish."

Those two kinds being found occasionally together, have been considered as appertaining to the same species, by others, beside Gronovius, and Pennant. But it is scarcely any longer a matter of opinion with many, they are pretty generally admitted by Ichthyolo-

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inattention of the designer. This precludes the possibility of quoting them as synonyms with confidence. From the position of the angulated kinds, indeed, when subjected to the eye of the artist, except in a profile view, the anal fin must be necessarily concealed beneath the abdomen: but the omission, or misrepresentation of the other fins are not excusable on this account.

The indefinite figure (No. 61, of Pennant's Zoology,) in all probability had lost the pectoral fins, since the description we suppose to relate to this figure, (No. 60.) speaks of those fins, as does also the description (No. 61.) to which that figure refers. Bloch is persuaded, that Osbeck has misled Linnæus, in describing his species Pelagicus without an anal fin, conceiving that part to have been accidentally destroyed. In this particular we have endeavoured to shew that Bloch is not correct, but in the present circumstance it proves how easily one species may be mistaken for another, when their specifical distinction is taken chiefly from the fins only.

gists at this time, to be specifically different. Linnæus describes them in the same words, observing only, that the body in Typhle is six sided, while that of Acus has seven sides. The seventh angle in Acus, is formed by the raised line that extends longitudinally along the belly, commencing at the throat, and reaching down to the vent. This line in Acus is prominent and distinct. In Typhle such a line is observable likewise, traversing the center of the abdominal plates in a similar manner, but it does not assume the strongly elevated form of a carina as in Acus.

Linnæus regards the number of annulations in those species, only as secondary to his specific characters. In this respect, he is perfectly right. We have examined many of both kinds, and find that although in point of number there is generally an agreement between the specimens of each individual sort, they are not constantly the same. For instance in Typhle, the number of whose joints are stated at 18 in the trunk, and 36 in the tail, we have found instead with 18...37—19...36—and 17...42, the latter nearly corresponding with Acus. And Acus which is said to have 20 joints in the trunk, and 43 in the tail, is also susceptible of variation.

This irregularity in the number of the annular joints, leads us to have recourse to other characters, in which respect the structure of the snout appears more constant than almost any other. So far as we have been able to ascertain the circumstance, this may be trusted. In all the specimens of Typhle we have examined, the snout is large, broad, and sub-compressed on the sides. It passes from the crown of the head, which is flat, to the mouth, in a straight line, or with very little sinuosity; instead of which, in Acus, the outline from the nape over the crown of the head rises conspicuously, then takes a curva-

ture over the eye, and slopes considerably towards the base of the snout. When viewed in profile, the difference between the two is very striking, the snout of Acus never appearing to exceed in breadth two thirds of the head; while in Typhle, the snout and head are both of the same breadth. Had not Linnæus previously assigned a specific character to this species, we should for this reason call it latirostris, in order to distinguish it at once from the other kind.

It may be questioned whether the S. Typhle of Bloch be not rather a variety of Acus in a young state, in which the belly has been perhaps but slightly carinated. The structure of the snout as represented, is exactly that of Acus. He speaks also of five rays in the anal fin, which is only one less than in Acus, at the same time that it is two more than is usual in the anal fin of Typhle.

The number of rays in the dorsal fin of the specimen delineated in our Plate is forty-one; in the pectoral fin twelve; in the anal fin three; and in the tail twelve

This kind is found in all the northern seas of Europe. The colour is variable from greenish olive, to olivaceous yellow, and brown variegated sometimes with dark, or blueish lines. Its length seldom exceeds a foot.

PELAGIC PIPE-FISH.

52 98

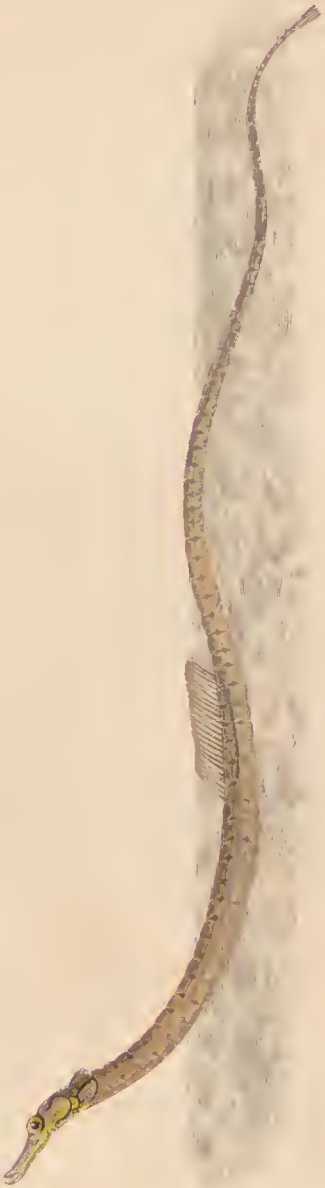

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PLATE LVIII.

SYNGNATHUS PELAGICUS.

PELAGIC PIPE-FISH.

***** *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head small. Snout sub-cylindrical, long, turned up at the apex. Mouth terminal, without teeth or tongue, and furnished with a lid. Lower jaw moveable. Gill-covers large, striated, and closed or shut up. Spiracle on the nape tubular, the opening small. Body articulated with many sided scales. No ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Pectoral and caudal fin radiated: anal fin none; body linear and seven sided.

SYNGNATHUS PELAGICUS: pinnis pectoralibus caudæque radiatis, ani nulla, corpore linearis septemangulato.

SYNGNATHUS PELAGICUS: pinnis pectoralibus caudæque radiatis ani nulla, corpore septemangulato. *Linn. Gmel. Syst. Nat.* 1455. *sp.* 3.

SYNGNATHUS PELAGICUS. *Osbeck it.* 105.

LE SYNGNATHE TUYAU. *Bosc. Dict. Nat. T.* 21. *p.* 315.

PLATE LVIII.

This is a diminutive sort of Pipe-fish, not unfrequently caught in the winter season among the sprats near our coasts. At the first glance, this little Fish appears to bear a very strong resemblance to Syngnathus Acus, and may possibly have been confounded with the young of that species, for it has hitherto remained unnoticed as a native of our seas *.

The body of this species is marked longitudinally with seven angles, in which particular it agrees with Syngnathus Acus. It differs in being of a more linear form, the snout is comparatively smaller, and the whole length of the fish scarcely ever exceeds five or six inches: those of seven inches long may be considered of a large size. The colour is pale brown, marked more or less distinctly with transverse darker bands, but this is no positive criterion, the species can be distinguished only by its linear form, the shape of the snout, the greater number of joints in the body and tail, and by the total absence of the anal fin.

Osbeck is the first describer of this species. He speaks of it as an inhabitant of the Indian seas. Most likely it is of the migratory kind, as it has been oftentimes seen floating with fuci, and other marine weeds, both in the Indian and Atlantic ocean. Osbeck describes it as destitute of an anal fin, which Bloch observes, has led Linnæus into an error. Lacepede conjectures, however, that Bloch is himself mistaken, and being unacquainted with the true Pelagicus, has repre-

* Quere. May not Pennant's figure, *No.* 61, *of Plate XXIII. Vol. III of Brit. Zool.* be taken from a fish of this species, in which the pectoral fins and tail were dried up, or had been destroyed by accident?

sented a variety of Acus under that name. This we are inclined to think correct, because the fish delineated by Bloch does not appear in any manner distinct from *Acus*, except in the slight distortion of the body near the dorsal fin, and in having the body striped transversely with a darker colour.

In the dorsal fin of the specimen we have represented, there were twenty-three rays, in the pectoral fin fourteen, and in the tail ten.

SNIPE, OR TRUMPET FISH.

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PLATE 99

PLATE LXIII.

CENTRISCUS SCOLOPAX.

SNIPE, OR TRUMPET FISH.

***** *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head produced into a very narrow snout: mouth without teeth, lower jaw longest. Aperture of the gills repandate. Body compressed: abdomen carinated. Ventral fins united.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body scaly, and rough: tail straight, and extended.

Centriscus Scolopax: corpore squamoso scabro, cauda recta extensa. *Gron. Zooph. p.* 128. *n.* 395.—*Gmel. Syst. Nat. T.* 1. *p.* 3. *p.* 1461. *sp.* 2.

Balistes *Scolopax* pinna dorsali anteriore quinqueradiata, rostro longissimo maxilla inferiore operculato. *Linn. Syst. Nat. X. I. p.* 329. *n.* 8.

Balistes aculeis 2. loco pinnarum ventralium, solitario infra anum. *Art. Gen.* 54. *syn.* 82.

Centriscus scolopax. *Bloch auf. Fisch. I. p.* 55. *n.* 1. *t.* 123. *f.* 3.

PLATE LXIII.

Meerschnepf, and Schneppenfisch. *Germ.*—Bécasse, *Fr.*
Trumpet, or Bellow's-fish. *Will. ichth. p.* 160. *t.* 1. *I.* 25. *f.* 2.
Raj. pisc. 50.

Centriscus Scolopax is to be considered as one of the most choice of our British fishes. Mr. Pennant never met it, nor does he mention it on the authority of any other observer in the British Zoology. We are acquainted with one or two, if not more, well authenticated instances of its having been observed upon the western coasts of England, about Devonshire and Cornwall. In the adjacent seas, to the southward, this curious fish becomes rather common, especially towards the coast of France, where the fishermen distinguish it by the name of *Bécasse*, and *Bécasse de Mer*, the Snipe fish, or Sea Snipe. And again, in the Mediterranean sea it is more abundant still, being commonly brought with other fish to the markets for sale. The flesh of this species is very palatable, and wholesome, according to the accounts of those who have visited the south of Europe, and eaten of them, but being small they are esteemed of little value.

This is a fish of singular conformation; nor is it, in our opinion, more remarkable for its singularity than its uncommon share of elegance. It scarcely ever exceeds the size of our figure. The whole body is covered with rigid, pointed scales. Its colour is variable, from a pale red to a purplish, or sanguineous colour, and in one of two specimens in our collection the sides, and abdomen, are glossed with a rich yellow, or golden colour.

PLATE LXIII.

Although this fish be not of the voracious kind, which the structure of its elongated jaw must render impossible, it may prove itself on some occasions a formidable enemy to other fishes of a diminutive size, being capable of inflicting a grievous wound with the strong serrated bony spine, or process, which constitutes the first ray of the anterior dorsal fin. Besides this spine, the same fin contains three other rays of a bony texture, but these are slender, and, comparatively to the former, very small. The rays of the second dorsal fin are soft, and amount to nine in number: in the pectoral fin are fifteen rays; ventral seven; anal thirteen; and caudal fifteen.

LUMPSUCKER.

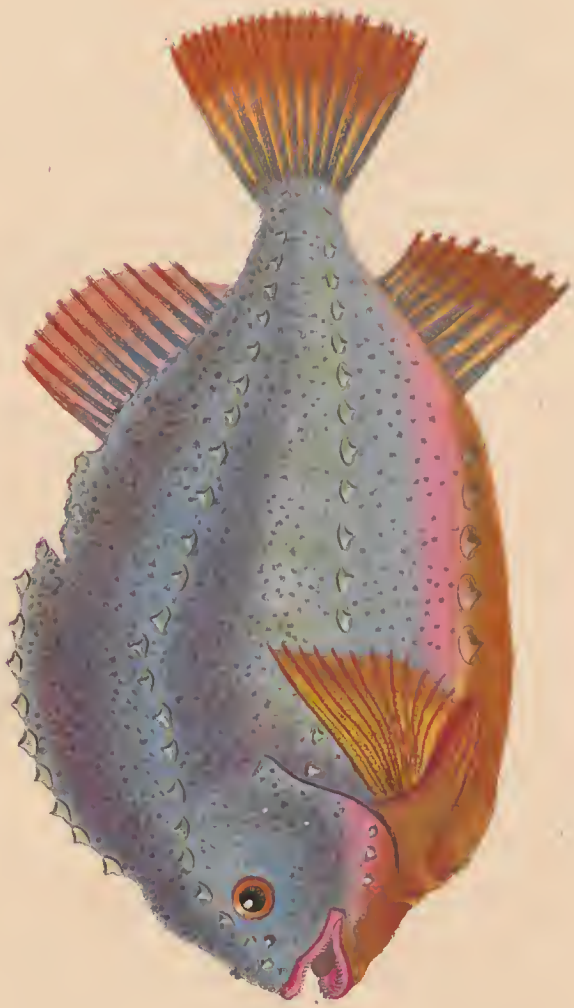

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PLATE X.

CYCLOPTERUS LUMPUS.

LUMP SUCKER.

** *BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head obtuse, mouth in the anterior part: tongue short and thick, jaws furnished with numerous minute sharp teeth. Branchostegeous membrane with four rays: cover of a single piece. Body short, thick, destitute of scales. Ventral fins connected: the sucker between them.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body angulated, with bony tubercles.

Cyclopterus Lumpus: corpore squamis osseis angulato. *Gmel. Syst. Nat. T.* 1. *p.* 3. 139. *sp.* 1. 1473.

Cyclopterus ordinibus tuberculorum septem. *Block.*

Lump, Sea Owl or Cock Paddle. *Will. Icht.* 208.—*Raii syn. pisch.* 77.

Lump Sucker. *Penn. Brit. Zool. v.* 3. *p.* 133. *sp.* 57.

This species frequents the British shores in the spring, and by some the flesh is thought not indifferent when broiled, or stewed, after the

skin is taken off. Mr. Pennant says, they resort in multitudes at that season to the coast of Sutherland, near the Ord of Caithness; and that the seals which prey upon them leave the skins; numbers of which thus emptied, float at that time ashore. It is easy (adds that writer) to distinguish the place where seals are devouring this or any unctuous fish, by the smoothness of the water immediately above the spot; it being the property of oil to still the agitation of the waves, and render them smooth.

The Lumpsucker is found throughout the seas in the north part of Europe. The Greenlanders, it is said, call them Nipisets, and are remarkably fond of them, as they are of oily food in general.

Its organ of adhesion or sucker is large, and consists of a singular fleshy substance, surrounded by numerous little papilla; by means of which it adheres to the rocks in a manner truly astonishing. A fish of a moderate size has been known to suspend a weight of above twenty pounds upon which it had accidently fastened itself. Mr. Pennant says still more, for he has known that on flinging a fish of this kind just caught into a pail of water, it fixed itself so firmly to the bottom, that on taking it by the tail, the pail was lifted up, though it contained some gallons of water.

One or two writers think this species is sufficiently characterised by the number of the tuberculated angles of the body, which are seven, namely, three on each side, and one along the back. The dorsal fin is placed near the tail, and consists of eleven rays; in the pectoral fin are twenty; anal ten, and twelve in the tail.

UNCTUOUS LUMP SUCKER.

101

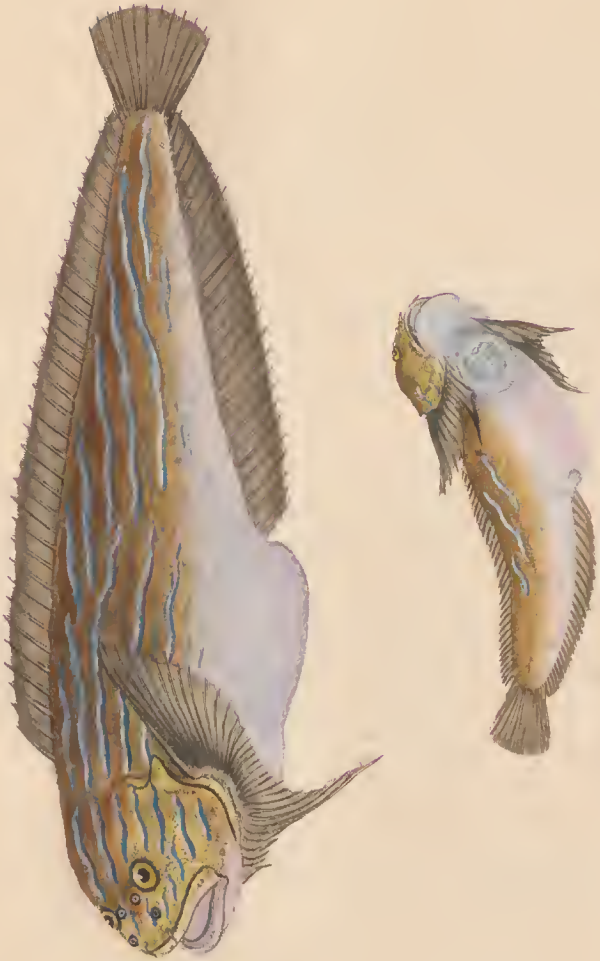

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PLATE XLVII.

CYCLOPTERUS LIPARIS.

UNCTUOUS LUMP-SUCKER.

* *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head obtuse, mouth in the anterior part: tongue short and thick, jaws furnished with numerous minute sharp teeth. Branchostegous membrane with four rays: cover of a single piece. Body short, thick, destitute of scales. Ventral fins connected: the sucker between them.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body naked: dorsal, anal, and tail fin united.

Cyclopterus Liparis: corpore nudo, pinnis dorsali anali caudalique unitis. *Art. Syn. p.* 117. *n.* 1.—*Gmel. Syst. Nat.* 1477. *sp.* 3.—et Cyclopterus lineatus. 1478. *sp.* 8.

Cyclopterus pinna pectorali-barbiformi. *Bloch. Aus. Fisch.* 1. *p.* 48. *n.* 2. *t.* 123. *f.* 3. 4.

Cyclogaster. *Gronov. Mus.* 2. 157. *Act. helv.* 4. *p.* 265. *t.* 23.

Sea Snail. *Wil. Icht. App.* 17. *Raii syn. pisc.* 74.

Unctuous Lump-sucker. *Penn. Brit. Zool.* 3. *p.* 135. *n.* 58.

PLATE XLVII.

Last winter a small fish of this curious kind presented itself by accident to our observation, amongst a parcel of sprats brought for sale to the fish-market at Billingsgate. Notwithstanding the extreme singularity of its appearance, we were led in the first instance to consider it only as a ſtrongly marked variety of Cyclopterus liparis, and this opinion we are inclined to retain after comparing it accurately with other specimens, that are indisputably of the liparis species.

When perfectly fresh, the head and body of this fish were strongly marked with longitudinal streaks and waves of white, edged with blue, and disposed on a ground of testaceous or rather chesnut colour. It seemed, therefore, to accord pretty exactly with the Cyclopterus lineatus of Gmelin, a species described by that author on the authority of a paper written by Iwan Lepechin, and inserted in the 18th volume of the Transactions of the Royal Society of Petersburgh. Our conjectures in this respect were confirmed on adverting to that paper, for there cannot remain a doubt of the Cyclopterus lineatus of Lepechin, being in reality of the same kind as our fish. This point decided, it only rests with us to examine in what particulars the lineatus differs specifically from liparis, before we presume to announce the discovery of a new British species, however gratifying such discovery would be to our assiduous perseverance, in endeavouring to ascertain the native products of our country.

Cyclopterus liparis, it should be premised, differs in no respect in the general figure, from Cyclopterus lineatus. The body being naked, and the dorsal, anal, and caudal fin being united, constitutes the character of this species; or in the language of Artedi and Gmelin, "corpore nudo, pinnis dorsali anali caudalique unitis."

There is nothing in this character expressly different from that which Lepechin, and on his authority Gmelin assigns to his lineatus "corpore nudo, pinnis dorsali, et anali sensim in caudalem excurrentibus," because in both the dorsal and anal fins are connected with the tail, and the trivial distinction of those fins running gradually into the tail, is insufficient to mark the species, as the same circumstance is observable in Cyclopterus liparis.

Lepechin has thus far failed in endeavouring to assign to his species lineatus, such a character as may distinguish his fish from liparis. But before we intrude our individual opinion in preference to that of Lepechin, which has been received as correct by one of the most distinguished societies in Europe, we shall examine the general description, in order to discover if possible some peculiarities in the Cyclopterus lineatus of that writer, that are not observable in C. liparis; and these we think might be readily detected in the detail he has given, if there really existed any difference between them.

The colour of lineatus is described as being of a chesnut colour,* except the belly, and part immediately surrounding it: the throat pale, and tuberculated: lower lip faint rosy: and both the head and body marked with pretty broad whitish lines, some of which are straight, and the others undulated. Although this be not very commonly the appearance of liparis, we have the authority of several writers, for asserting that the back and sides are not unfrequently variegated, spotted, and striated longitudinally with brown.

* Color totius piscis castaneus, excepto ventre cum vicina, gula pallidioribus tuberculisque labri inferioris dilute roseis. Per caput atque latera corporis ducuntur lineæ longitudinales, sat latæ et partim rectæ, partim undulatæ ad caudam convergentes, exalbiolæ, &c. I. Lepech.

In the latter case, the brown stripes would leave the intermediate spaces of a still lighter colour, and in those instances where the fish proved to be strongly marked, would give it the same appearance as the lineatus of Lepechin. We have observed liparis to differ very considerably in colour at different seasons of the year, as well as in the various stages of their growth. Small specimens have occurred in which the sides and belly were white; in some pale yellow, and in others rosy; the sides of the head usually partaking of the same tints as those of the body. In a fish which we find to be so liable to variation, both in respect of its colours and markings, we do not think the longitudinal striæ on lineatus to be sufficient to characterise it as a species distinct from liparis, or even to authorise us in believing it to be any more than an accidental variety of that fish.

But before we conclude with this opinion, our attention reverts to what another author has said of this fish. Bosc in the Nouveau Dictionnaire d'Histoire Naturelle, calls this species Le Cycloptère Rayé a un seul rayon à la membrane des branchies, &c. In our specimen this character seemed to exist, there appearing to be really only one ray in the gill-membrane, but on carefully inserting the end of the finger under the gills, the membrane expanded, and displayed seven branchiostegous rays, as in liparis. The specific character which Bloch gives for the last mentioned fish, namely, the barbiform appearance of the pectoral fins, is also very clearly to be observed in both.

The Unctuous Lump-sucker is a native of the northern parts of Europe. Those found on our own coasts seldom exceed the length of four or five inches, but such as frequent the shores of Greenland and Kamtschatka, are oftentimes of a size, far more considerable,

being from a foot to eighteen inches in length: The flesh of this fish is remarkably soft and oily, and is never eaten except by the inhabitants of Greenland, who devour it with avidity, and esteem it most delicious.

In the dorsal fin we found thirty-six rays: pectoral thirty-two: anal twenty-six: tail twelve.

OCELLATED SUCKER.

London: Published as the Act directs by W. Darlington, & R. & C. Harrington, May 1, 1845.

PLATE LXXVI.

CYCLOPTERUS OCELLATUS.

OCELLATED SUCKER.

* *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head obtuse, mouth in the anterior part: tongue short and thick, jaws furnished with numerous minute sharp teeth. Branchostegous membrane with four rays: cover of a single piece. Body short, thick, destitute of scales. Ventral fins connected: the sucker between them.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body naked, attenuated behind, and livid: snout projecting: tenacula four before the eyes; and two large ocellar spots on the hind part of the head.

CYCLOPTERUS LUMPUS: corpore nudo postice attenuato livida, fronte producto, tentaculis quatuor ante oculos, occipite maculis duabus magnis ocellaribus.

LEPADOGASTER, *Gouan. pisc.* 177. *t.* 1. *f.* 6. 7.

LESSER SUCKING-FISH. *Borlase Cornw.* 269. *t. f.* 28.

JURA SUCKER. *Pen. Brit. Zool. T.* 3. *p.* 137. *n.* 59.

CYCLOPTERUS LEPIDOGASTER, JURA SUCKER. *Turt. V.* 1. *p.* 907.

PLATE LXXVI.

CYCLOPTERUS CORNUBICUS, CORNISH SUCKER. *Shaw Gen. Zool. V. 5. p. 2. p. 397.*

For the discovery of this curious species of Cyclopterus on the British coast we are indebted to Dr. Borlase: he found it on the coast of Cornwall, and described it under the name of the *Lesser Sucking-fish*, in his Natural History of that county. It was afterwards observed by Mr. Pennant, in his tour through Scotland, in the sound of Jura, and from this latter circumstance it is called the Jura Sucker in the British Zoology of that author. And since that time it has occurred upon other parts of the western coasts of England, besides Cornwall.

As we cannot but disapprove the changing of established names in the science of natural history, unless very cogent or sufficient reasons can be at the same time advanced in favour of the supposed emendation, we think Mr. Pennant not entirely free from blame in abolishing the name given to it by Borlase, and substituting that of the Jura Sucker. The alteration is very likely to mislead the inexperienced naturalist into a belief of the species being peculiar to the Sound of Jura; or at least that it was originally detected in that Sound, neither of which suggestions have the least foundation. Mr. Pennant knew that the same fish had been previously found in Cornwall by Dr. Borlase, and therefore if he had conceived the name of Lesser Sucking-fish inapplicable, it would have been certainly more consistent to term it the Cornish, than the Jura Sucker. Neither of those names are indeed in our mind admissable, because the characters of the fish itself affords one altogether expressive of the species, and which cannot easily be overlooked. Dr. Shaw seems conscious of an im-

propriety in naming it the Jura Sucker, and therefore calls it the Cornish Sucker, *(Cyclopterus Cornubicus,)* in allusion to its original discovery on the coast of Cornwall: in every other particular Dr. Shaw has too implicitly acquiesced to the descriptive detail of Pennant, the substance of which it will not be improper to transcribe in this place previous to entering upon the history of this fish.

" Its length is about four inches. The skin without scales, slippery, and of a dusky colour. The body taper. The nose grows slenderer from the head, and ends round."

" The teeth small. Before each eye is a small filament. Behind the eyes are two semilunar marks.

" In the middle of the back an oval mark formed by small dots of a whitish colour. The dorsal fin lies near the tail, and consists of eleven rays. The tail is rounded. The ventral have four rays, are joined by an intervening membrane with an oval depression in the middle. Beyond that is another strong membrane with a similar depression. By means of these instruments it adheres to stones or rocks." *Penn. Brit. Zool. v.* 3. *p.* 137.

Early in the month of February last, through the politeness of a very valuable correspondent, G. Montagu, Esq. of Kingsbridge, Devonshire, we were enabled to correct several errors in the above description. Mr. Montagu, before this time, had taken an opportunity of describing this as a plentiful species on the rocks of Milton on the coast of Devonshire, in an interesting miscellaneous paper inserted in the seventh volume of the Transactions of the Linnean Society of London: the observation induced us to request the favour

of a few recent examples of the fish, and shortly after, in compliance with our wishes, Mr. Montagu obliged us with five specimens of it, the whole of which, as they were observed to differ in a few slight particulars from each other, it was thought might afford us a more adequate conception of this beautiful species than any solitary specimen. Among them were examples of the two sexes, and transitions of growth that are highly interesting. The whole arriving in excellent condition enabled us also to notice various circumstances that can only be observed in recent specimens.

The largest of those fishes was selected for representation, and of which, it is presumed, the figure which exhibits both the upper and lower surface will convey a far more correct idea than any general description we can subjoin. This, however, it should be observed, was of a lighter colour than the rest, and had also the spots on the body more distinct. The others were more dusky, or darker; and two of them inclining to purplish brown, with minute inconspicuous spots: the dorsal, anal, and caudal fins were also of a brighter purplish-red in the deeper coloured specimens than in that we have represented. Sometimes specimens occur that have the tail barred with white. The most striking peculiarities, however, of those fishes at the first view, was the perfectly ocellated appearance of the two large distinct spots on the posterior part of the hind head, which Mr. Pennant, and after him Dr. Shaw, denominate *semilunar marks;* and the four conspicuous erect cirri, two of which are situated before each eye, but which both those writers term a *single filament.* The occellated spots are remarkable, and contribute much to the beauty, as well as singular appearance of the fish: each consists of a large obovate spot of a deep purple, inclosed within a broad pale brownish ring, and embellished in the center with a brilliant blue dot, or pupil. Generally

speaking, those spots become obscure soon after the fish dies; in others, they remain for two, three, or four days, nearly as distinctly visible as in the living fish. We have specimens even that have been immersed for months in spirit of wine, in which those spots, though faint, may be observed, if attentively examined.

The four cirri before the eyes are of a fine red colour, they are erect, or slightly bending backwards, and two are rather shorter than the others: those cirri are disposed in pairs, a longer and shorter one being situated before each eye; at the base they are connected, but from thence they rise separately, and are perfectly distinct. How Pennant could have mistaken those cirri, so far as it appears he has done, is unaccountable: indeed his figures seem to be at variance with his description, as though his artist had observed two filaments before each eye in the very specimen represented, instead of one, as Pennant describes it: there is certainly a slight appearance at least, of two filaments before each eye, in both the figures of the Jura Sucker given in the British Zoology.

Gmelin omits this species of Cyclopterus in his edition of the Linnæan Systema Naturæ. Turton, in his translation of that work, supplies the omission, describing it as Cyclopterus Lepidogaster, or Jura Sucker: his specific character, however, being taken from Pennant, is erroneous in the last mentioned particular, for he speaks of a single filament before each eye as a principal criterion of the species, but which, it appears from the above particulars, is not correct; neither is the snout of this fish truncated as that author describes.

The general appearance of this species is sufficiently explained by the figure accompanying this description. The dorsal fin in our

largest specimen contains eleven rays: pectoral fin seventeen: anal ten: and tail six. The dorsal and anal fin are connected by a short membrane to the base of the tail.

This species is found abundant on the rocks at Milton, on the Devonshire coast, as before observed, where it can only be obtained at low water, as it is never taken in the dredge.

BIMACULATED SUCKER.

103

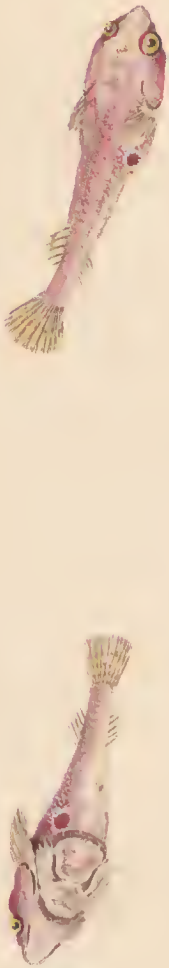

PLATE LXXVIII.

CYCLOPTERUS BIMACULATUS.

BIMACULATED SUCKER.

* *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head obtuse, mouth in the anterior part: tongue short and thick, jaws furnished with numerous minute sharp teeth. Branchostegous membrane with four rays: cover of a single piece. Body short, thick, destitute of scales. Ventral fins connected: the sucker between them.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body naked, attenuated behind, and rosy; with a purple spot surrounded by a white ring on each side of the abdomen.

CYCLOPTERUS BIMACULATUS: corpore nudo postice attenuato roseus; macula ventrali utrinque violacea albo-cincta.

BIMACULATED SUCKER. *Penn. Brit. Zool. Append. v.* 3. *n.* 397. *t.* 22.—*Montagu, in Linn. Trans. Soc. v.* 7. *p.* 293.

PLATE LXXVIII.

This species of Sucker is of a small, or rather diminutive size, but will not be considered uninteresting either in point of beauty or rarity. Whether it has ever been discovered on any other than the British coasts, admits of doubt; a variety of circumstances incline us to believe it has certainly not. Among the continental naturalists, it appears to be noticed only by those of France; and we may infer, from the tenor of their observations, that they are indebted to our countryman Pennant for every particular respecting it*. The species escaped the researches of the indefatigable Bloch, and it is also omitted in the Gmelinian edition of the Systema Naturæ.

The first account given of this Cyclopterus is to be found in the Appendix of Pennant's British Zoology; who informs the reader, her Grace the Duchess Dowager of Portland did him the honour of communicating it. He describes it as having "the head flat and tumid on each side: the body taper: the pectoral fins placed unusually high. It has only one dorsal fin; placed low, or near the tail. The tail is even at the end. The colour of the head and body is of a fine pink: of the fins, whitish. On each side of the engine of adherence on, the belly, is a round black spot. Found near Weymouth."—It may not be improper to add, that the specific character assigned to the bimaculated Sucker, by Dr. Turton †, and

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* "*Le Cycloptère bimaculé* a les nageoires pectorales situées vers le derrière de la tête, et une tache noire sur chaque côté du corps. Il vit dans les mers d'Angleterre" *Bosc, &c.*

† "*Cyclopterus bimaculatus, Bimaculated Sucker.* Head flat, tumid each side, tapering to a point; pectoral fins placed near the nape, &c." *Turt. Trans. Linn. Syst.*

the general account by Dr. Shaw*, accord in every respect, except a slight variation of language, with the above description.

A far more copious and satisfactory account of this elegant species appeared last year, in a paper written by G. Montagu, Esq., of Knowle, in Devonshire, and inserted in the seventh volume of the Transactions of the Linnæan Society. Mr. Montagu informs us, he has frequently taken this species, by deep dredging, at Torcross, in Devonshire, adhering to stones and old shells, and has kept several alive for a day or two, in a glass of sea water. The first specimen of this fish we possessed, was taken on that coast by Mr. Montagu, and communicated to us in spirits, with an accurate description of its appearance while living. We have since found one specimen of it ourselves, affixed by its sucker to the shell of an oyster, in dredging on the coast of Kent, near the Nore.

It appears, both from the observations of Mr. Montagu, who has had frequent opportunities of examining this fish, and from the solitary individual we have found, that Mr. Pennant was mistaken as to one very striking and, indeed, decisive character of this species: the black abdominal spots, as he terms them, but which, in the recent fish, are purple; those purple spots are encircled with a narrow ring of white, which contributes much to the elegance of the fish, and forms a striking characteristic of the species.

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* "*Cyclopterus Bimaculatus.* C. roseus, macula utrinque ventrali nigra, &c." *Shaw. Gen. Zool. v. 5. p. 2. p.* 398.

PLATE LXXVIII.

The general tint of this fish is a delicate rose colour, or pink, very prettily speckled with extremely minute dots of white. The irides are pink, with an inner golden circle, and blue pupil; and the fins are variegated, or barred with reddish. This beautiful creature is said to exceed, though rarely, an inch and a half in length. The upper figures in our plate exhibit the fish much above the natural size of our largest specimen, to afford an opportunity of delineating it with more correctness than could conveniently be accomplished within a smaller compass. The dorsal fin, which is placed far behind, contains five rays: pectoral, eleven apparent rays: ventral four: anal five: and caudal twelve.

DIMINUTIVE LUMP SUCKER.

London, Pub.d by the Act directed by E. Donovan, F.L.S. & J. Nicholson, Feb.y 1, 1805.

PLATE LXVIII.

CYCLOPTERUS MONTAGUI.

DIMINUTIVE LUMP-SUCKER.

**** *PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head obtuse, mouth in the anterior part: tongue short and thick, jaws furnished with numerous minute sharp teeth. Branchostegous membrane with four rays: cover of a single piece. Body short, thick, destitute of scales. Ventral fins connected: the sucker between them.

SPECIFIC CHARACTER.

Body naked, lanceolate, diaphanous, tinged with reddish, and spotted with fuscous: dorsal, anal, and caudal fin distinct: organ of adhesion oval.

CYCLOPTERIS MONTAGUI: corpore nudo lanceolato diaphano rubescente fusco-maculato, pinnis dorsali anali caudalique distinctis, orbiculo ovali.

For our acquaintance with this beautiful little species of Cyclopterus we are entirely indebted to the friendly communication of George Montagu, Esq. of Knowle House, Devonshire, by whom

it was discovered, and in compliment to whom we name it Montagui.

Mr. Montagu has seen three or four specimens of this fish on the Devonshire coast, two of which he found lately near the Thurlstone rock, on the South coast of Devonshire. This diminutive species is about three-fourths of an inch in length: perfectly smooth; of a pale colour, tinged with pink, and marked all over the upper parts and sides with numerous distinct roundish spots of purplish brown. The head is large, and rather inflated about the gills, contracting a little in front: the body decreases gradually as far as the vent, and afterwards still more considerably quite to the tail. The mouth is not large in proportion to the size of the fish: its irides are silvery, with the pupil black: gill covers obscure. It has no visible lateral line. The pectoral fins consist of seventeen or eighteen rays; these are placed just before the sucker or instrument of adhesion, and turn underneath: the ventral fins nearly unite at their base, partly surround the sucker, and are so approximate to the pectoral fins as to appear connected: the anal fin is formed of about thirty rays, commencing immediately behind the vent: the dorsal fin originates a little nearer towards the head*, but many of the first rays are imperceptible without the assistance of a deep lens; those which are conspicuous amount to about sixteen or eighteen, and both the anal and dorsal

* An oversight in the drawing and account sent to us by Mr. Montagu in the first instance has been kindly corrected since the plate was published. Mr. Montagu had delineated and described the dorsal fin as originating lower towards the tail than the anal fin; but soon after discovering another specimen, he perceived that he had before entirely overlooked the anterior part of the dorsal fin, which consists, as above mentioned, of a number of almost imperceptible rays, connected to the series of conspicuous rays that are expressed in the profile figure of the fish; the upper one in Plate 68.

fins terminate close to the tail; the caudal fin is rounded, consisting of fifteen rays, and is marked with two transverse bands. The sucker, or organ of adhesion, is of an ovate form, the disk of which is radiated from a central longitudinal line, and the radius is divided into many lobes or compartments by means of oblique curved lines; the surface of this part is flat, but forms a prominent rim to the disk. The whole fish when alive is diaphanous, and the fins are remarkably pellucid.

The above description was obligingly communicated to us by Mr. Montagu, who accompanied this account with an elegant drawing taken from the fish while living, or very recent, and kept in sea-water under the lens of a microscope for that purpose; and it is from this drawing the figures in the annexed plate are copied, not having ourselves been so fortunate as to meet with this curious fish. This is a liberty in which we can scarcely think it right to indulge, having already professed our intention of confining ourselves, in this Work, to those particular species of British fish that happen to fall under our immediate observation, and the originals of which are in our own possession. The present is a solitary, and it is presumed an excusable deviation from our design, to which we have acceded, in our desire to enrich the British *Fauna* with an interesting fish, that might have otherwise been omitted: we neither distrust the accuracy of the drawing, or the account sent with it, considering the respectable quarter from whence it was received; but it is notwithstanding proper to acquaint the reader upon what authority such a novelty is introduced.

This minute kind of Cyclopterus is brought forward as a new species with some caution. Its diminutive size forms no positive

criterion of its being new, since it might be only the fry of some kind sufficiently well known when full grown; but this, we are persuaded, from its characteristic particulars, cannot be the case. It may be the young of a larger species, but whatever may be the size to which it attains at maturity, it is certainly new, in our opinion. The nearest to which it approaches is Cyclopterus Liparis, and it is evidently distinct from that. According to Mr. Montagu, the dorsal and anal fin terminate close to the tail, but are not connected with it, as we have observed to prevail unerringly in Cyclopterus Liparis. This may not be altogether satisfactory, when we consider how liable the membranes, which connect those fins, are to be severed asunder by accident. The structure of its sucker, or organ of adhesion, offers a more decisive character: that of Liparis is circular, with the disk broad, and somewhat heart-shaped: Cyclopterus Montagui has on the contrary a sucker nearly of an ovate form, the disk of which is oval. In both, the sucker is divided into two lateral lobes by means of a longitudinal ligament, but in Liparis this ligament is broad, of a flimsy texture, and not immediately perceptible among the tranverse folds of the sucker, while in Cyclopterus Montagui the longitudinal line is narrow, and distinctly marked; but the exterior outline of the radius, and the disk, are alone perfectly sufficient to prove them distinct species without a reference to any other character.

Several new species of Cyclopterus of a small size are mentioned by Gmelin, on the authority of Pallas, who describes them at length, and gives figures of them in his Spicilegia Zoologica, neither of which agree however with our Cyclopterus Montagui. We at first suspected it might be his *minutus* from its size, general habit, and form of the sucker, but the dorsal spine on the anterior part of the back, and two bony tubercles on the sides, which

Pallas describes, removes it entirely from our fish. We are indeed fully satisfied, that it does not correspond with any species of the Cyclopterus genus hitherto described, resting our decision upon the fidelity of the drawing with which we have been favoured, excepting only the omission of the anterior part of the dorsal fin, as before noticed.

COMMON ANGLER.

London, Published as the Act directs by E. Donovan, & E. & J. Rivington, Nov.1.1808

PLATE CI.

LOPHIUS PISCATORIUS.

COMMON ANGLER.

***PISCES BRANCHIOSTEGI.*

GENERIC CHARACTER.

Head compressed downwards: teeth numerous and acute; tongue broad and armed with teeth: eyes vertical: noſtrils small: gills three, aperture lateral and simple: pectoral fins (in most species) somewhat resembling feet: dorsal and anal fin oppoſite, and near the tail: body deſtitute of scales, and covered with a thin loose skin: vent in the middle of the body: no lateral line.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body depressed: head rotundate.

Lophius Piscatorius: depressus, capite rotundato. *Linn. Fn. Suec.* 298.—*Müll. prodr. Zool. Dan. p.* 38. *n.* 321.

Lophius ore cirroso. *It. scan.* 327.—*Linn. Mus. Ad. Fr.* 55. *Gron. muſ.* 1. *p.* 57.

Lophius capite corpore latiore. *Bloch Fisch. Deutschl.* 3. *p.* 82. *n.* 1. *t.* 87.—*Le Diable de Mer. ib.*

Rana piscatrix, &c. *Borlas. Cornub.* 265. *t.* 27. *f.* 3. 6.

Toad-fish, Frog-fish, Sea-Devil. *Will. Ichth. p.* 85. *t. E.* 1.

PLATE CI.

FISHING-FROG. *Parsons. Act. Angl.* 1764. *n.* 53. *p.* 170. *t.* 13.
Angler. *Brit. Zool.* 3. *p.* 93. 95. *n.* 1. 2. *t.* 94.

The Lophius Piscatorius is a fish of uncommon aspect and deformity, bearing a remote resemblance to the figure of the common frog in the tadpole state. Pliny and other Latin writers among the ancients call it *rana* and *rana marina*, in allusion to this similitude. The French, for the same reason, call it Grenouille de mer: the English fishermen the Fishing Frog, and Frog-fish; and the inhabitants of various other countries by names equally significant of its general resemblance to the tadpole of the common frog *. The English name of Angler is of modern origin, and not familiar to our fishermen: it is a name assigned to it by Mr. Pennant, in his British Zoology, and is sufficiently expressive of the very singular arts employed by this curious fish in the capture of its prey.

The head, which constitutes the greater part of the whole animal, is perfectly characteristic of the fish: this is of a roundish figure, somewhat convex above, and flat beneath: the body, which is of a size comparatively small, tapers gradually from behind the pectoral fins to the tail. The mouth is preposterously large; the lower jaw is advanced beyond the upper, and is furnished with a vast number of long, roundish and acute teeth, disposed in two or more rows, and the posterior ones are moveable; in the upper jaw are three rows of

* Belon says they further resemble the frog, affirming, that the pectoral fins of the Fishing Frog serve the animal for the purposes of feet, and that with those it walks at the bottom of the sea as the frogs do in the bogs and marshes.

teeth similar to the others. The tongue is whitish, and in one of our specimens elegantly marbled with black. The eyes, which are placed on the summit of the head, are black, and curiously radiated with white. Upon the anterior part of the head, before the eyes, are two long slender moveable filaments or tentacula, the use of which is so well described by Pliny *, in speaking of the manners of this fish, they are of a horny substance, and when complete are very long. Besides those filaments on the head, Mr. Pennant speaks of three others on the back: those latter however it should be observed are not distinct filaments like the others, but the rays of a genuine dorsal fin, being united together by a web; and which induces us to believe the specimen examined by Mr. Pennant, must have been imperfect in this particular. The whole body is covered with a thin and loose skin, which is destitute of scales, and is of a brown colour, varied with darker fuscous, and blackish; the under side white: the pectoral fins also, which are very large, are of a brown colour above and white beneath. The margin of the head and body is fringed with a number of small processes of a skin-like substance. The posterior dorsal fin is situated near the tail, and is of a brown colour; the tail blackish.

The fish seldom occurs of greater length than twenty or thirty inches, but they are said to attain to a much larger size, even to the length of five or six feet. It is a general inhabitant of the North and Mediterranean Seas, and is found, though not very commonly, on the coasts of England; towards the Scottish islands, if we are not misinformed, they are rather more abundant. As this fish swims indifferently, and cannot pursue its prey with success, like many others,

* "*Eminentia sub oculis cornicula turbato limo exerit, assultantes piscules attrahens, donec tam prope accedant, ut assiliat.*" Plin. Lib. ix. c. 14.

it adopts a different mode of attack; it lays itself in ambush, half covered with marine plants, or behind hillocks of sand and stones at the bottom of the water; and in this situation throws out the long tentacula of its head, to attract the attention of the smaller fishes: those singular and useful processes from their vermicular motion, as they wave in the water, are easily mistaken for worms, which the little fishes approaching with confidence attempt to seize, and being thus enticed close to the mouth of the Fishing Frog, who laid before unperceived below, fall an easy prey to their wary enemy. The English fishermen believe this fish to be very destructive to the broods of young sharks, and under this idea, whenever they draw them up in their nets, throw them back again into the sea. The flesh of this fish is white, and having, it is said, the same flavour as the common frog, is eaten in many countries as a delicacy.

The small dorsal fin on the anterior part of the back contains three long setácious rays, and one behind very small; the posterior dorsal fin contains fourteen rays: pectoral fin twenty-seven rays: ventral five: anal eight; and tail eight.

COMMON STURGEON.

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London, Pub.d by the Architects by E. Donovan, F.L.S. & C. Rivington, 1 Nov.r 1804.

PLATE LXV.

ACIPENSER STURIO.

COMMON STURGEON.

***** *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Head obtuse. Mouth beneath the head, retractile, toothless: cirri four, placed under the snout, and before the mouth. Aperture of the gills on each side. Body elongated, with numerous plates, disposed in series along the angles of the body.

SPECIFIC CHARACTER

AND

SYNONYMS.

Snout obtuse: transverse diameter of the mouth equal to its length: beards on the snout nearest the tip: lips bifid.

ACIPENSER STURIO: rostro obtuso, oris diametro transverso longitudini æquali. *Güldenst. nov. comm. Petrop.* 16. *p.* 532.—*Gmel. Linn. Syst. Nat. T. I. p.* 3. *p.* 1483. *sp.* 1.

Acipenser cirris 4. squamis dorsalibus 11. *Linn. Syst. Nat.*—*Mus. Ad. Fr.* &c.

PLATE LXV.

Acipenser corpore tuberculis spinosis exasperato. *Art. gen.* 65. *synn.* 91. *Fn. Suec.* 27.

Acipenser cirris 4, corpore tuberculorum spinosorum seriebus quinqueangulo, rostro subacuto. *Gron. mus.* 1. *p.* 60. *n.* 131. *Zooph. p.* 39. *n.* 140.

Sturio sive Silurus. *Salv. aq.* 11.

Acipenser scutorum ordinibus quinque ad corpus asperum. *Bloch Fisch. Deutschl.* 3. *p.* 89. *n.* 1. *t.* 88.

Sturgeon. *Brit. Zool.* 3. *p.* 127. *Pl.* xix.

The largest Sturgeon perhaps ever caught in the rivers of this country, is that mentioned by Mr. Pennant to have been found in the river Esk some years ago, which weighed four hundred and sixty pounds. Those of a smaller size, namely, from forty to fifty, or sixty pounds, are not by any means common, but when they attain to above an hundred pounds in weight they are certainly scarce. About twelve months ago a Sturgeon, weighing one hundred and thirty-one pounds, was caught in the river Maldon, near the Bucleigh Mills, and this stands recorded as a very remarkable incident.

A Sturgeon of five hundred and fifty pounds weight, caught in one of the Italian rivers in the year 1750, was esteemed so great a rarity, according to Bloch, that the Duke de Carpinetto, who received it, made a present of it to the Pope. In the northern parts of Europe, Sturgeons even of this enormous size do not appear to be remarkably uncommon. In some of the Norwegian rivers, and in Siberia, we are told the Sturgeon grows to such a vast size, that the roe alone

taken from a single fish will sometimes weigh from two to three hundred pounds; and were we to give implicit credit to the assurances of some writers, we might even suppose that Sturgeons are taken at times in those parts of a thousand pounds weight each.

In all the northern parts of the world the Sturgeon fishery seems to be considered as an object of the greatest consideration. In the north of Europe, Asia, and America, there are regular fisheries for them. In Russia the principal season for taking them, as Pallas acquaints us, is in the depth of winter, when the natives assemble at a stated period, and breaking through the ice, take them in great abundance from the rivers, with the assistance of spears, or harpoons, and long poles furnished with hooks at the extremity. The flesh of the Sturgeon is excellent, and is eaten either fresh, salted, or pickled in a peculiar manner. In this latter state it constitutes an article of extensive and lucrative commerce with those countries where the Sturgeon is less plentiful; as does likewise the caviare, three different kinds of which they prepare from the roe of this fish.

The Sturgeon is a creature of a sluggish, quiet, nature, alternately inhabiting the fresh waters, and the sea, and subsisting on the smaller kinds of fish. It has been observed, that those Sturgeons which have remained during the winter in the fresh waters return again to the sea on the approach of summer. This appears to be contrary to their usual course, for they commonly ascend the rivers in the spring after remaining in the sea all the winter.

In our fish the dorsal fin contains thirty-five rays: pectoral fin twenty-eight: ventral fin twenty-four: anal twenty-three, and the tail one hundred and twenty-five.

SEA MONSTER.

London. Pub.d as the Act directs 29 Decr 1820 by E. Orme 59 New Bond Street.

PLATE CXI.

CHIMÆRA MONSTROSA.

SEA MONSTER.

****** *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Head pointed above: spiracle single, quadripartite, and under the neck: mouth placed beneath: upper lip five cleft: cutting teeth two in front both above and below: body elongated: dorsal spine single.

SPECIFIC CHARACTER

AND

SYNONYMS.

Snout with porous folds beneath: tail filiform.

CHIMÆRA MONSTROSA: rostro subtus plicis pertusis, cauda filiformi.

CHIMÆRA MONSTROSA: rostro subtus plicis pertusis. *Linn. Faun. Suec.* 294.

Chimæra Monstrosa. *Bloch Ausl. Fisch. I. p.* 161. *n.* 1. *t.* 124.

Chimera. *Ascan. ic. rer, natur. t.* 15.

Squalus cauda longiore, quam ipsum corpus. *Art. Gen.* 68.

Genus Galci. *Jonst. pisc. t.* 44. *f.* 2.

Simia marina. *Gesn. aq. p.* 877. *ic. anim. p.* 153.

PLATE CXI.

Centrina prima, Centrina vera, Simia marina danica. *Aldr. pisc.* *p.* 402. 403. 405.

Vulpecula. *Ström. söndm. p.* 289.

This is a fish of very singular appearance and beauty. The body is of a lengthened form, compressed and gradually tapering towards the tail, which terminates in a long slender filament. The head is large, thick, and ascending in front into a pyramidal form: each jaw is furnished with a pair of broad laminæ, which are crenulated at the tip: the upper lip is divided into five parts, and the front, from the mouth to the eyes, is marked by transverse undulations and pores; a line of this kind runs across the forehead beneath the point or tip, and is continued in a serpentine course into the lateral line; and another line passes from this beyond the eyes, which returns again towards the nostrils.

The whole body is dark-brown above, varied with yellowish brown and silvery, and the lower parts of a bright silver colour. The eyes large and of a green colour, with silvery irides, and very brilliant, or shining with phosphoric splendour. The male is distinguished by having a small fringed crest on the top of the head, and by the rough lengthened processes at the anal fin, which correspond with those observed in the males of the Ray and Shark tribe.

The Chimæra Monstrosa inhabits the northern seas of Europe, and is rarely seen so far to the southward as the British Isles: it grows to the length of three or four feet, and subsists on marine worms and fish of the smaller kinds. The Norwegian fishermen

call it the king of herrings, from the circumstance of its being often lurking among the shoals of that fish, the flesh of which appears to be its principal food. The flesh is hard, coarse, and uneatable; the inhabitants of Norway employ, however, the roes of this fish in their pastry, and in making cakes; and extract an oil from the liver, which they consider of singular efficacy in disorders of the eyes.

There are two species of the Chimæra genus, Monstrosa, and Callorhynchus; the latter of which is distinguished by the name of Southern Chimera and Elephant Fish.

LESSER SPOTTED SHARK.

London, Pub.d as the Act directs by R. Ginsburn & F.P. Harrington, July 1, 1801.

PLATE LV.

SQUALUS CATULUS.

LESSER SPOTTED SHARK.

***** *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Head obtuse. Spiracles four to seven, placed on the side of the neck, and semilunar. Eyes oblong, vertical, half covered, and situated before the temporal orifices. Mouth beneath, in the anterior part of the head: teeth numerous, serrated, acute, partly moveable: partly fixed; and unequal. Body oblong, roundish, and rough, with tender prickles. Ventral fins for the most part smaller than the pectoral; approximate, and situated round the vent, or genitalia, in the males.

SPECIFIC CHARACTER.

Nostrils surrounded with a lobe and vermiform appendage: ventral fins united.

SQUALUS CATULUS: naribus lobulo et appendice vermiformi cinctis, pinnis ventralibus concretis. *Gmel. Linn. Syst. Nat. p.* 1490. *sp.* 10.

Squalus varius pinnis ventralibus concretis. *Bloch. Aush. Fisch.* 1. *p.* 21. *n.* 5. *t.* 114.

Lesser Dog-fish. *Penn. Brit. Zool.* 3. *p.* 90. *n.* 9.

PLATE LV.

The Lesser Spotted Shark is of the number of those voracious creatures that haunt our coasts in plenty, and prove injurious to our fisheries. They are often captured by the fishermen in the net when trawling for flat fish.

The largest specimen of this kind we have taken is two feet five inches in length; and they very rarely exceed that measurement. There is another species that approaches very nearly to this that grows to about twice that size. This is Squalus Canicula, a fish so nearly resembling the present both in the form of the body, the colours and spots, as scarcely to be distinguished from it, except by the ventral fins, which are always found unconnected with each other, while in Squalus Catulus they are as invariably united. Gmelin is in doubt whether Squalus Catulus may not be the male of Squalus Canicula.

Both kinds are found in all the European seas; and it is also said in those of India.

No 109

PORBEAGLE SHARK.

London, Publ.d as the Act directs by E.Lemon, 4 & 5 Red Lion Court, Fleet Street, 1807.

PLATE CVIII.

SQUALUS CORNUBICUS.

PORBEAGLE SHARK.

****** *PISCES CHONDROPTERIGII.*

GENERIC CHARACTER.

Head obtuse. Spiracles four to seven, placed on the side of the neck, and semilunar. Eyes oblong, vertical, half covered, and situated before the temporal orifices. Mouth beneath, in the anterior part of the head: teeth numerous, serrated, acute, partly moveable, partly fixed, and unequal. Body oblong, roundish, and rough, with tender prickles. Ventral fins for the most part smaller than the pectoral, approximate; and situated near the vent, or genitalia, in the males.

SPECIFIC CHARACTER

AND

SYNONYMS.

Snout projecting, conic, and porous each side: posterior part of the body depressed, and angulated.

Squalus Cornubicus: rostro prominente conico, lateribus minute perforato, corpore postice depresso angulato.

Squalus Cornubicus: plica longitudinali ad utrumque caudæ latus. *Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. 1497.

Squale nez. *Brousson. Act. Paris.* 1780. *p.* 667. *n.* 16.

Porbeagle. *Borlas. Cornub.* 265. *t.* 26. *n* 4.

Porbeagle. *Penn. Brit. Zool. v.* 3. *p.* 117. *n.* 49.

Beaumaris Shark. *Penn. Brit. Zool. v.* 3. *p.* 118. *n.* 50. *Linn. Trans. v.* 3.

PLATE CVIII.

There is every reason to apprehend, that the first account of this species of Shark extant, is to be found in that well-known work the *Natural History of Cornwall*, by Dr. Borlase, where it occurs under the title of the Porbeagle. The notice of the species is extremely concise, but is accompanied with a tolerable figure of the animal, engraved after a drawing by the Rev. Mr. Jago, minister of Loo, in that county, in the time of Ray.

The description of the Porbeagle in Mr. Pennant's work is taken from Dr. Borlase's figure, and is so far pretty correct. Gmelin describes the Porbeagle under the specific name of *Cornubicus*, referring for authorities to the works of Dr. Borlase, Pennant, and also the paper in the Parisian Transactions, by Broussonet, treating of the *Squale nez*, which he considers to be of the same kind. One of the latest and best accounts of the fish is from the pen of Dr. Goodenough, Bishop of Carlisle, who describes a specimen, found on the coast of Hastings in 1803, with considerable accuracy, in the third volume of the Transactions of the Linnæan Society. The individual mentioned had been landed four hours when Dr. Goodenough first saw it, and then weighed twenty-six pounds: the body, from the tip of the nose to the extremity of the tail, was three feet ten inches; the colour on the back deep blue, and silvery white beneath. The nose was projecting and sharp, and on both sides from the nose to the eyes were many minute perforations or pores. The general shape of the body was roundish, except for about six inches from the tail, where it was depressed, and formed an angle or elevated line on each side. The teeth vary in number, according to the age of the fish, specimens being found with one, two, or even three rows, when the animal attains to a large size.

PLATE CVIII.

The ample account Dr. Goodenough affords, agrees with our specimen, which measures nearly four feet in length, and possesses a triple series of long acute teeth in each jaw. Beside this example, which we procured in a recent state, the head of another, of larger size, is preserved in our Museum: the animal to which the latter belonged must have been about five feet in length, as nearly as can be estimated. Those are the only specimens we have seen, and hence we must conclude that it cannot be a very common fish on our coasts. From the structure of its teeth it is supposed to be of the voracious kind of Sharks; its food is uncertain, for upon opening the stomach of our recent fish, that part was observed to be empty; the same circumstance was remarked likewise upon opening that examined at Hastings, as above mentioned. The fins of this Shark are rather large, that of the tail especially, which is of a semi-lunar form, with the upper lobe or horn longer than the lower one *.

From a reference to our synonyms it will be seen, that the Porbeagle and Beaumaris Shark are considered by us as the same animal, contrary to the opinion generally prevalent with naturalists, and the testimony of Mr. Pennant. Gmelin is an exception, for he makes the Beaumaris Shark a variety of the other, though on what autho-

* In the description of the Beaumaris Shark, lately published by Dr. Shaw, it is stated, that "in the British Zoology, the upper lobe of the tail is said to be ten, and the lower thirteen inches long, but it is clear, from the plate engraved from Mr. Davies's drawing, this is an error." Vide *Gen. Zool.*—There appears to be some oversight in this remark on the part of the last-mentioned ingenious writer instead of Mr. Pennant; for it will be seen, on reconsulting the description in the British Zoology, that the upper horn of the tail is "*one foot* ten inches, and the lower one foot one," which agrees exactly with the figure of the tail in the drawing.

rity we cannot pretend to determine *. The suspicions of Gmelin on this subject are not altogether unfounded, though it must be remarked, that it is not exactly a variety of that species, but precisely the same fish.—This we are at liberty to state on the best authority, having been favoured some years ago by the Rev. Mr. Hugh Davies, of Beaumaris (the gentleman from whom Mr. Pennant acknowledges to have derived his information of the fish) with the orginal drawing and description from whence the account of the Beaumaris Shark in the British Zoology was taken †. This drawing was liberally put into our hands by Mr. Davies, with permission to employ it in any manner likely to promote science; and we cannot therefore consistently pass over it without offering some further observations respecting it. From a slight comparison there appears sufficient reason to regret, that a very striking dissimilarity prevails between the plate in the above work and the original drawing from whence it professes to be copied, the figure in the plate having been injudiciously altered to the fancy of the artist, or the engraver, to give the animal a better contour. By this means the accuracy of the first design is entirely lost, and the deviation rendered considerable; insomuch indeed as to convey an idea of a very distinct fish, and thus involve the history of the species itself in obscurity. Dr. Goodenough is among the number of those misled by an implicit reliance on the plate in the British Zoology; for he observes (depending on the accuracy of the drawing) that his fish, (Squalus Cornubicus,) cannot be the same as the

* Dr. Turton, contrary to the example of his author, makes two distinct species of those fishes in his translation of the Systema Naturæ.

† "*Beaumaris Shark.* This species was observed by my friend the *Rev. Mr. Hugh Davies, of Beaumaris*, who favoured me with the description, and an accurate drawing made from the fish taken in a neighbouring wear." *Penn. Brit. Zool. V. 3. p. 128. n. 50.*

PLATE CVIII.

Beaumaris Shark, as the first has a blunt nose, the Cornubicus a sharp one. In the original drawing the nose is sharp, and the whole body of a much more slender figure than the engraving represents. —There is in fact not the slightest difference between the original drawing of the Beaumaris Shark by Mr. Davies, and the Squalus Cornubicus;—they are both of the same species,

PICKED SHARK, OR DOG FISH.

London, Pub.d as the Act directs by E. Donovan & F. & C. & J. Rivington, Oct.r 1.1803.

PLATE LXXXII.

SQUALUS ACANTHIAS.

PICKED SHARK, or DOG FISH.

* *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Head obtuse. Spiracles from four to seven, placed on the side of the neck, and semilunar. Eyes oblong, vertical, half covered, and situated before the temporal orifices. Mouth beneath, in the anterior part of the head: teeth numerous, serrated, acute, partly moveable: partly fixed; and unequal. Body oblong, roundish, and rough, with tender prickles. Ventral fins for the most part smaller than the pectoral, approximate, and situated round the vent, or genitalia, in the males.

* Section. *With temporal orifices, and no anal fin.*

SPECIFIC CHARACTER

AND

SYNONYMS.

Fuscous-grey, beneath white: body roundish: two dorsal fins with an anterior spine each.

SQUALUS ACANTHIAS: fusco-cinereis, subtus albus: corpore teretiusculo, pinnis binis dorsalibus antice unispinosis.

SQUALUS ACANTHIAS: pinnis dorsalibus spinosis, corpore subtus albus.

PLATE LXXXII.

SQUALUS ACANTHIAS: pinnis dorsalibus spinosis, corpore teretiusculo. *Linn. Fn. Suec.* 295.—*Mus. Ad. Fr.* 1. *p.* 53.—*Ib. Wgoth.* 174. *Gmel. Linn. Syst. Nat. p.* 1500. *sp.* 1.

SQUALUS ACANTHIAS corpore teretiusculo, dorso biaculeato. *Bloch. Fish. Deutschl.* 3. *p.* 74. *n.* 1. *t.* 85.

Galeus Acanthias sive spinax. *Rondel.* 373.
Will. Ichth. 56.
Raii. Pisc. p. 21.

Aiguillat. *Brousson. Act. Par.* 1780.

PICKED-BACK SHARK. *Penn. Brit. Zool. v.* 3. *p.* 100. *sp.* 40.

The picked Shark, or Dog-Fish, seldom grows to the length of more than three or four feet; the larger ones usually weighing, at the utmost, about twenty pounds. The prey of this voracious animal consists principally of Herrings, Mackrel, and other fish that visit our shores in their periodical migrations from the north seas, and which the picked Dog-Fish pursues in immense bodies, following close in the rear of the shoals. This species is far more abundant in the northern than southern parts of Europe: it appears in the Baltic only rarely; on the coast of Greenland, Iceland, and the north of Scotland, it infests the seas, and shores in swarms. The flesh of this species is esteemed more delicate, and palatable, than the rest of the shark tribe; and being taken in the greatest abundance by the Scotch fishermen, constitutes an article of food among the lower orders, who either eat it fresh, or cure it for exportation. The Icelanders, as well as the Scotch, prepare a vast quantity of this fish by splitting it, and ex-

posing it in the air to dry: "it forms (says Mr. Pennant) a sort of internal commerce on the coasts of Scotland, being carried, on women's backs, fourteen or sixteen miles up the country, and sold or exchanged for necessaries. In some of the northern countries the natives extract an oil from this fish."

The present species is principally distinguished from the rest of the Shark tribe, by the strong bony spine situated before each of the two dorsal fins. This is not, however, sufficient to distinguish it from every other species of Shark, the Linnæan Squalus Spinax possessing the same character. Those two analogous species, though so closely allied to each other, may be readily ascertained by the colour of the belly, which in our species is perfectly white, in S. Spinax, dusky or black. Gmelin considers as a variety of Squalus Acanthias, the fish described by Molina in his History of Chili, a kind of Shark similar to ours, but having the body marked with ocellated spots. We are not perfectly clear as to this being a variety only, suspecting rather that it must be a distinct species, in which case there would be three kinds of Squalus, known by having both dorsal fins armed anteriorly with a single spine each.

Writers mention that the Danish and Norwegian fishermen regard the spines of Squalus Acanthias as poisonous, and are therefore extremely cautious in its capture. It has been stated by Bloch, that those spines appear already formed in the young Shark before it is excluded from the egg, only that they are not then so hard as in the full grown animals. Two small specimens that have lately occurred to our observation seem, however, to prove, that this is not precisely the fact. These were each about five inches long,

and in both those fishes the dorsal spines, though observable, were by no means completely formed: they were only visibly protruded just above the skin at the base of the anterior part of the dorsal fins, while in the full grown animal they were conspicuously erect, and nearly the full length of the fin. This fish is said to couple in September.

ANGEL SHARK.

London, Published for the Art-Union by E. Dawson, S. & C. Rivington, Dec.r 1841.

PLATE XVII.

SQUALUS SQUATINA.

ANGEL SHARK.

PISCES CHONDROPTERYGII.

GENERIC CHARACTER.

Head obtuse. Spiracles four to seven, placed on the side of the neck, and semilunar. Eyes oblong, vertical, half covered, and situated before the temporal orifices. Mouth beneath, in the anterior part of the head: teeth numerous, serrated, acute, partly moveable: partly fixed; and unequal. Body oblong, roundish, and rough, with tender prickles. Ventral fins for the most part smaller than the pectoral, approximate, and situated round the vent, or genitalia, in the males.

SPECIFIC CHARACTER

AND

SYNONYMS.

Pectoral fins large, and notched in front.

Squalus Squatina: pinnis pectoralibus maximis anterius emarginatis. *Gmelin. Syst. Nat. T.* 1. *p.* 3. *p.* 1503. *sp.* 4.

Squalus pinna anali nulla, caudæ duobus, ore terminali, naribus cirrosis. *Linn. Syst. Nat.* 12. 1. *p.* 398.

PLATE XVII.

Squalus capite plagioplateo lato, ore in apice capitis, naribus cirrosis. *Gron. Mus.* 1. 137. *Zooph.* 151.

Rhina sive Squatina autorum. *Klein. miss. pisc.* 3. *p.* 14. *n.* 1. *t.* 2. *f.* 5. 6.

Angel Fish. *Penn. Brit. Zool. T.* 3. *p.* 98. *sp.* 39.

L'Angelot de Mer. *Block.*

The Angel Fish appears to be an intermediate creature between the two genera Rays and Sharks; although it is with most propriety referred to the latter. Of its fierceness and voracity, there are many instances; and it grows sometimes to such an enormous size, as to become truly formidable. Mr. Pennant knew an instance of a fisherman whose leg was terribly torn by a large one, which lay within his nets in shallow water, and which he went to lay hold of incautiously.

Like the Ray, the Angel Fish feeds on flounders and other flat fish, which keep at the bottom of the water; and haunts our coasts in abundance. They are sometimes caught, and brought to the fish markets, where they are sold under the name of *Fiddle Fish*, or *Puppy Fish*: the flesh is very indifferent, and the price of course is inconsiderable. Among the ancients it was in great esteem as an article of food; they considered it the most delicate of the whole cartilaginous tribe.

The largest creature of this kind that is recorded as a native of our seas, weighed nearly an hundred weight: in the North and Mediterranean Seas, where it is also very frequent, there are in-

stances known of its having been taken of the length of six or eight feet, and the weight of one of that size must be very great.

Above, the colour is of an ash colour, of various shades, according to the age of the fish: faintly speckled, and rough, with little prickles; beneath, it is entirely white. The Romans formerly made use of the skin to polish their wood and ivory; and the Turks, it is said, make their best shagreen of it at this time.

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ELECTRIC RAY.

London. Pub.d as the Act directs by S. Hansman & F.& C. Rivington. March 1.1802.

PLATE LIII.

RAJA TORPEDO.

ELECTRIC RAY.

****** *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath near the neck: head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed: body thin, depressed, and rhombic.

SPECIFIC CHARACTER.

Body entirely smooth.

RAJA TORPEDO: tota lævis. *Linn. Mus. Fr.* 2. *p.* 50.—*Arted. gen.* 73. *syn.* 102.—*Gmel. Syst. Nat. T.* 1. *p.* 3. 1504. 130. *sp.* 1. *Bloch aus. Fisch.* 1. *p.* 44. *n.* 7. *t.* 122, 3, *p.* 118.

Raja dorso monopterygio, cauda brevi apice pinnato, lævis, inermis, rostro subobtuso. *Gronov. Zooph. n.* 152.

TORPILLE, *Duhamel*, *Lacépede*, &c. Torpille, Torpéde, *fr.* Tremble, and Domiggliose at Bourdeaux, upon the coast of Poitou, Gascony, &c.—Zitterfisch

PLATE LIII.

Germ.—Krampfisch. *Holl.*—Torpedine *Sardinia.* Occhiatella *Rome*, Salvian.

TORPEDO, CRAMP-FISH. *Will. Ichth.* 81. *Raii Syn. Pisc.* 28.

ELECTRIC RAY. *Penn. Brit. Zool. Vol.* 3. *p.* 89. *sp.* 36.

It was not before the latter part of the preceding century that the Torpedo was clearly proved to be an inhabitant of the British seas. The first account of it as such that may be relied upon, is contained in a letter addressed by Mr. Walsh to the late Mr. Pennant, dated June 23, 1774, which was laid before the Royal Society of London, and published in their transactions of that year. "To the author of the British Zoology (says Mr. Walsh) it will, I am persuaded, be no unwelcome information, that the Torpedo, or Electric Ray, frequents the shores of this island, contrary to a received opinion among naturalists, who have, in general, considered it as an inhabitant only of warmer climates."

In consequence of the enquiries set on foot by Mr. Walsh in some of our southern fishing ports, he had received several Torpedos from the coast of Devonshire, when this information was communicated. These were chiefly from Torbay. One obtained from Brixham weighed fifty-three pounds avoirdupois weight, and measured four feet in length, two feet and a half in breadth, and four inches and a half in extreme thickness. The size of this Fish, as Mr. Walsh observes, was enormous, for, he tells us, the largest of seventy specimens examined by him in the neighbourhood of Rochelle, where they are not uncommon, weighed little more than ten pounds, and

measured not quite two feet in length, nor sixteen in breadth; and that mentioned by Redi to Lorenzini, which was considered very large, weighed only twenty-four pounds.

This Fish is much more frequently taken on the southern coast, in the vicinity of Torbay, than upon any other of the British shores. Mr. Grant, a fishmonger on the spot, acquainted Mr. Walsh, that it is however by no means found in plenty even here, as it rarely happens that more than one is taken at a time; nor can the proper season for catching them be ascertained, as they have been seen at all times of the year. The usual depth of water in which they are caught is from thirty-six to forty fathom, and being of the Ray kind are commonly taken with them. As to the time when their young are to be seen, Mr. Grant observes, no satisfactory information can be obtained, but it is imagined, that the season for them and the Rays is the same. He further adds, that the benumbing qualities of these fish is pretty strong through the net, though much weaker than when they are taken out. The Torpedo has been taken also of a large size near Mountsbay, Cornwall. Mr. Smith, in his History of Waterford, speaks of one six or eight pounds weight, being taken about sixty years ago at Dungarvan in Ireland. At Ring, a village in the neighbourhood of that place, Mr. Walsh was told they sometimes capture two or three of them in the course of a year. Mr. Pennant relates that it has been once caught off Pembroke, and we can further say, upon the best authority, that this species has been more than once taken upon the sandy coasts near Tenby, in the county of Pembrokeshire, South Wales.

That the history of the Torpedo has undergone more assiduous investigation than that of almost any other creature of the finny race,

is a truth of which every naturalist must be aware. Among the earlier writers of antiquity this Fish was perfectly well known. Hippocrates mentions the Torpedo, classes it with the edible kinds of fishes, and recommends the flesh as proper food for persons affected with the dropsy. Aristotle speaks of it in terms that leave no doubt upon the mind of the classic reader, that he was to a certain extent acquainted with its manners of life *. Pliny only repeats the observations of Aristotle, his disciple Theophrastus, and other Greek writers of celebrity, when he asserts, that the Torpedo knows her own powers, in being able to benumb others without being herself affected. Aristotle tells us, as well as Pliny, that the Torpedo conceals itself in the mud, and waits in readiness to exert its benumbing influence upon the fishes that swim over it, and which falling motionless as if they were dead to the bottom, become an easy prey to this their lurking enemy†. Aristotle was himself apparently indebted for this knowledge, at least in some degree, to preceding writers, whose labours have not survived the wreck of time. That Plato was acquainted with the peculiar powers of this Fish before that period is evident: there is one very striking passage in his dialogue between Socrates, and another which proves the truth of this opinion beyond dispute.—"Thou hast benumbed my senses by thy objections, as that great fish of the sea, the *Torpedo*, benumb those who approach it." The evidence of Tiphilus, of Plutarch, Oppian, and other writers of antiquity, might be mentioned also, were it incumbent to prove, that

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* Arist. lib. v. c. 5.—Lib. ix. c. 37. Nαζαν.

† "Quo magis miror quosdam existimasse, aquatalibus nullum inesse sensum. Novit torpedo cum suam ipsa non torpens: morsaque in limose occultat, pisces qui securi super natantes obtorpuere corripiens." *Plin. lib. IX. c.* 42.

the Torpedo had been considered in all ages as an object of considerable interest and curiosity.

But when we reflect upon the infant state of natural philosophy in those early ages, the testimony of those writers must be admitted with caution. The ancients knew this Fish, and they also knew the benumbing powers which nature has endowed it with, but its history was still involved in fable. To the united exertions of talents, and assiduous investigation, which in a pre-eminent degree distinguished the former century, we are indebted for the only authentic particulars respecting it, that can be relied upon in confidence. The accurate Borelli, and Lorenzini, and after them the indefatigable Reaumur, opened the way to an accurate enquiry into the electric properties of the animal by dissecting it, and pointing out in a perspicuous manner, the organs through whose medium this property is exerted. To say that the cause and effects arising from the shocks of the Torpedo were however proved to be electric by either of those writers, would be erroneous. The credit of this discovery is due to the memory of our own countryman, Mr. Walsh, who, by a series of experiments before unattempted, was enabled to demonstrate the fact. It was by the fortunate application of the newly detected principles of electricity, as a cause to the effects which it was already known this animal possessed, that Mr. Walsh was more happy in his speculations than his predecessors. He was the first to reason upon the analogy between the powers of electricity, and the inherent electricity of this creature. His experiments were pursued with the greatest industry, and in the sequel proved both satisfactory and conclusive. But Mr. Walsh was himself disposed, with becoming candour, to allow every honour to his friend Dr. Franklin, whose important discoveries on electricity had laid the foundation upon which

his theory was established. This is sufficiently demonstrated in the conclusion of one of his letters on the Torpedo, in which he compliments his friend in an unusual strain of animation. " I rejoice (says Mr. Walsh) in addressing these communications to you. He, who predicted, and shewed that electricity wings the formidable bolt of the atmosphere, will hear with attention, that in the deep it speeds an humbler bolt, silent and invisible: He, who analysed the electrified phial, will hear with pleasure that its laws prevail in animate phials: He, who by reason became an electrician, will hear with reverence of an instinctive electrician *, gifted in his birth with a wonderful apparatus, and with the skill to use it." *Phil. Trans.*

The paper communicated by Mr. Walsh to the Royal Society in the year 1773, upon the subject of the Torpedo, are extremely curious. They embrace a variety of observations that occurred to him in the progress of his experiments, the most material of which it would be improper to pass over in silence: these we shall select, and lay before the reader as nearly as convenient in the language of the writer.

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* This is not the only creature endowed by nature with those amazing properties. *Gymnotus Electricus*, or the Electric Eel, possessing the same powers, as does likewise Silurus Electricus, though in a less vigorous degree, and perhaps many others not at present known may be gifted with a similar means of defence against their enemies. A recent French author (*Libes*) speaks thus of bodies which possess the inherent principles of electricity.— " Quelque substances naturelles reçoivent la vertu électrique des mains de la nature par des moyens qui nous sont encore inconnus; elles paroissent constamment dans l'etat électrique. Telle est une espèce de Raie qu'on trouve sur les côtes de France, et qui porte le nom de *Torpille*, parce qu'elle engourdit la main de celui qui la touche. D'autres poissons, tels que le *Trembleur du Niger*, et *l'Anguille de Surinam*, jouissent de la même propricté."

PLATE LIII.

The sea coast of France near Rochelle, and a small spot called the Isle of Ré, afforded Mr. Walsh an ample opportunity for prosecuting his experiments, the Torpedo being frequent in those places. He was restrained by the jealousy of the government, from making those experiments where these animals are caught, but he received them alive, and in such a state of vigour, as enabled him to proceed successfully in his enquiry. With respect to the effect of the Torpedo, he observes, "it appears to be absolutely electrical, forming its circuit through the same conductors with electricity, and being intercepted by the same nonconductors, as glass and sealing wax. The back, and the breast of the animal, appear to be in different states of electricity, I mean in particular the upper, and lower surfaces of the two assemblages of pliant cylinders, engraved in the work of Lorenzini. By the knowledge of this circumstance, we have been able to direct his shocks, though they were small, through a circuit of four persons all feeling them, and likewise through a considerable length of wire, held by two insulated persons, one touching his lower surface, and the other his upper. When the wire was exchanged for glass or sealing wax, no effect could be obtained, but as soon as it was resumed, the two persons became liable to the shock. These experiments have been varied many ways, and repeated times without number, and they all determined the choice of conductors, to be the same in the Torpedo, as in the Leyden phial. The sensations likewise, occasioned by the one and the other, in the human frame, are precisely similar. Not only the shock, but the numbing sensation, which the animal sometimes dispenses, expressed in French by the words *engourdissement* and *fourmillement*, may be exactly imitated with the phial, by means of Lane's electrometer; the regulating rod of which, to produce the latter effect, must be brought almost into contact with the prime conductor, which joins the phial.

PLATE LIII.

It is a singularity, that the Torpedo when insulated, should be able to give us insulated likewise, forty or fifty successive shocks, from nearly the same part; and these, with little, if any diminution of their force. Each effort of the animal to give the shock, is conveniently accompanied by a depression of his eyes, by which even his attempts to give it to the non-conductors can be observed: in respect to the rest of his body, he is in a great degree motionless, though not entirely so. I have taken no less than fifty, of the above-mentioned successive shocks, from an insulated Torpedo, in the space of a minute and a half. All our experiments confirm, that the electricity of the Torpedo, is condensed in the instant of its explosion, by a sudden energy of the animal; and as there is no gradual accumulation, or retention of it, as in case of charged glass, it is not at all surprising, that no signs of attraction or repulsion, were perceived in the pith balls. In short, the effect of the Torpedo appears to arise from a compressed elastic fluid, restoring itself to its equilibrium, in the same way, and by the same mediums, as the elastic fluid compressed in charged glass. The skin of the animal, bad conductor as it is, seems to be a better conductor of his electricity, than the thinnest plate of elastic air. Notwithstanding the weak spring of the Torpedinal electricity, I was able, in the public exhibitions of my experiments at La Rochelle, to convey it through a circuit formed from one surface of the animal to the other, by two long brass wires, and four persons, which number, at times, was encreased even to eight. The several persons were made to communicate with each other, and the two outermost with the wires, by means of water contained in the basons, properly disposed between them for that purpose; each person dipping his hands in the nearest basin, connectively with his neighbour on either side."

PLATE LIII.

" The effect produced by the Torpedo, when in air, appeared on many repeated experiments to be about four times as strong, as when in water."

The following detailed particulars, of a series of experiments performed by Mr. Walsh, in presence of the academy of Rochelle, appeared in the French Gazette of the 30th of October, 1772, as the extract of a letter received from Sieur Seignette, mayor of that place, and secretary of the academy.

" A live Torpedo was placed on a table. Round another table stood five persons insulated. Two brass wires, each thirteen feet long, were suspended to the ceiling by silken strings. One of these wires rested by one end on the wet napkin on which the fish lay: the other end was immersed in a basin full of water, placed on a second table, on which stood four other basins likewise full of water. The first person put a finger of one hand in the basin in which the wire was immersed, and a finger of the other hand in a second basin. The second person put a finger of one hand in this last basin, and a finger of the other hand in the third; and so on successively, till the five persons communicated with one another by the water in the basins. In the last basin, one end of the second wire was immersed; and with the other end, Mr. Walsh touched the back of the Torpedo, when five persons felt a commotion, which differed in nothing from that of the Leyden experiment, except in the degree of force. Mr. Walsh, who was not in the circle of conduction, received no shock. This experiment was repeated several times, even with eight persons; and always with the same success. The action of the Torpedo, is communicated by the same mediums, as that of

the electric fluid. The bodies which intercept the action of the one, intercept likewise the action of the other. The effects produced by the Torpedo, resemble in every respect a weak electricity. This exhibition of the electric powers of the Torpedo, before the academy of La Rochelle, was at a meeting, held for the purpose, in my apartments on the 22d of July, 1772, and stands registered in the journals of the academy."

Mr. Walsh further states, in relating this affair to the Royal Society of London, that the effect of the animal in these experiments, was transmitted through as great an extent and variety of conductors, as almost at any time he had been able to obtain it, and the experiments included nearly all the points, in which its analogy with the Leyden phial had been observed. These points were stated to the gentlemen present, as were the circumstances in which the two effects appeared to vary. It was likewise represented to them, that our experiments had been almost wholly with the animal in air: that its action in the water was a capital desideratum: that indeed, all as yet done, was little more than opening the door to inquiry: that much remained to be examined by the electrician, as well as the anatomist: that as artificial electricity had thrown light upon the operations of the Torpedo, this might in return, if well considered, throw light on artificial electricity; particularly in those respects, in which they now seemed to differ. The Torpedo in these experiments, dispensed only the distinct, instantaneous stroke, so well known by the name of the electric shock. That protracted but lighter sensation, that torpor or numbness which he at times induces, and from which he takes his name, was not then experienced from the animal; but it was imitated with artificial electricity, and shewn to be producible by a quick consecution of minute shocks.

This, in the Torpedo, may perhaps be effected by the successive discharge of his numerous cylinders, in the nature of a running fire of musquetry; the strong single shock may be his general volley. In the continued effect, as well as in the instantaneous, his eyes, which are usually prominent, are withdrawn into their sockets."

"A large Torpedo, very liberal of his shocks, being held with both hands, by his electric organs above and below, was briskly plunged into water, to the depth of a foot, and instantly raised an equal height in air; and was thus continually plunged and raised, as quick as possible, for the space of a minute. On the instant his lower surface touched the water in his descent, he always gave a violent shock, and another still more violent in his ascent; both which shocks, but particularly the last, were accompanied with a writhing in his body, as if meant to force an escape. Besides these two shocks from the surface of the water, which may yet be considered as delivered in the air, he constantly gave at least two when wholly in the air, and as constantly one, and sometimes two, when wholly in the water. The shocks in water appeared, as far as sensation could decide, not to have near a fourth part of the force of those which took place at the surface of the water, nor much more than a fourth of those entirely in air."

"The shocks received in a certain time were not on this occasion counted by a watch, as they had been on a former, when fifty were delivered in a minute and half, by the animal in an insulated and unagitated state: but from the quickness with which the immersions were made, it may be presumed there were full twenty of these in a minute; from whence the number of shocks in that time must have amounted to above an hundred. This experiment, therefore, while

it discovered the comparative force between a shock in water and one in air, and between a shock delivered with greater exertion on the part of the animal, and one with less, seemed to determine that the charge of his organs with electricity was effected in an instant, as well as the discharge."

" The Torpedo when put into a flat basket, open at the top, but secured by a net with wide meshes, and in this confinement was let down into the water a foot below the surface : being there touched through the meshes, with only a single finger, on one of his electric organs, while the other hand was held at a distance in the water, he gave shocks which were distinctly felt in both hands."

" The circuit for the passage of the effect being contracted to the finger and thumb of one hand, applied above, and below to a single organ, produced a shock, to our sensation, of twice the force of that in the larger circuit by the arms."

" The Torpedo still confined in the basket, being raised to within three inches of the surface of the water, was there touched with a short iron bolt, which was held half above, and half in the water, by one hand, while the other hand dipped, as before, at a distance in the water ; and strong shocks, felt in both hands, were thus obtained through the iron."

" A wet hempen cord being fastened to the iron bolt, was held in the hand above water, while the bolt touched the Torpedo, and the shocks were obtained through both these substances."

" A less powerful Torpedo, suspended in a small net, being frequently dipped into water, and raised again, gave, from the

surface of the water, slight shocks, through the net, to the person holding it."

"These experiments in water manifested, that bodies, immersed in that element, might be affected by immediate contact with the Torpedo; that the shorter the circuit in which the electricity moved, the greater would be the effect; and that the shock was communicable, from the animal in water, to persons in air through some substances."

"How far harpoons and nets, consisting of wood and hemp, could in like circumstances, as it has been frequently asserted, convey the effect, was not so particularly tried as to enable us to confirm it. I mention the omission in hope that some one may be induced to determine the point by express trial."

"We convinced ourselves, on former occasions, that the accurate Kæmpfer, who so well describes the effect of the Torpedo, and happily compares it with lightening, was deceived in the circumstance, that it could be avoided by holding in the breath, which we found no more to prevent the shock of the Torpedo, when he was disposed to give it, than it would prevent the shock of the Leyden phial."

"Several persons, forming as many distinct circuits, can be affected by one stroke of the animal, as well as when joined in a single circuit. For instance, four persons, touching separately his upper and lower surfaces, were all affected. Two persons likewise, after the electricity had passed through a wire into a basin of water, transmitted it from thence in two distinct channels, as their sensation convinced them, into another basin of water, from whence it was conducted,

probably in an united state, by a single wire. How much further the effect might be thus divided, and subdivided into different channels, was not determined; but it was found to be proportionably weakened by multiplying these circuits, as it had been by extending the single circuit."

A very complete, and most instructive series of the Torpedo, including both the sexes, with anatomical preparations of the several organs concerned in producing the electric effects of the animal, are preserved in the valuable collection of the late Mr. J. Hunter *, which we have been obligingly permitted to inspect. Most of those specimens were sent by Mr. Walsh, from the coast of France. Mr. Hunter was induced at the solicitation of Mr. Walsh, to prosecute his inquiries relative to the internal organization of the Torpedo, at the same time that Mr. Walsh was himself engaged in a course of experiments on its electricity, and the result of both were laid before the Royal Society, in the year 1773.

Of the general structure and anatomy of the Torpedo, Mr. Hunter observes in this paper †, he shall say nothing, because it does not differ materially in those respects from the rest of the Ray tribe, except in its electric organs, which he proceeds to explain as follows: "These organs are placed on each side of the cranium and gills, reaching from thence to the semicircular cartilages of each great fin, and extending longitudinally from the anterior extremity of the animal, to the transverse cartilage which divides the thorax from the

* The property at this time of the Royal College of Surgeons, London.

† *Phil. Trans.* 1773. *p.* 48.

abdomen; and within these limits, they occupy the whole space between the skin of the upper, and of the under surface: they are thickest at the edges, near the centre of the fish, and become gradually thinner towards the extremities. Each electric organ, at its inner longitudinal edge, is a convex elliptic curve. The anterior extremity of each organ, makes the section of a small circle; and the posterior extremity makes nearly a right angle with the inner edge. Each organ is attached to the surrounding parts by a close cellular membrane, and also by short and strong tendinous fibres, which pass directly across, from its outer edge, to the semicircular cartilages. They are covered above and below by the common skin of the animal; under which there is a thin fascia spread over the whole organ. This is composed of fibres which run longitudinally, or in the direction of the body of the animal: these fibres appear to be perforated in innumerable places; which gives the fascia the appearance of being fasciculated: its edges all round, are closely connected to the skin, and at last appear to be lost, or to degenerate into the common cellular membrane of the skin. Immediately under this is another membrane exactly of the same kind, the fibres of which, in some measure, decussate those of the former, passing from the middle line of the body outwards and backwards. The inner edge of this is lost with the first described; the anterior, outer, and posterior edges, are partly attached to the semi-circular cartilages, and partly lost in the common cellular membrane. This inner fascia appears to be continued into the electric organ, by so many processes, and thereby makes the membranous sides or sheaths of the columns, which are presently to be described; and between these processes the fascia covers the end of each column, making the outermost or first partition. Each organ is about five inches in length, and, at the anterior end, three in breadth, though it is but little more than

half as broad at the posterior extremity. Each consists wholly of perpendicular columns, reaching from the upper to the under surface of the body, and varying in their lengths, according to the thickness of the parts of the body where they are placed; the longest column being about an inch and a half, and the shortest about one fourth of an inch in length, and their diameters about two tenths of an inch. The figures of these columns are very irregular, varying according to the situation and other circumstances. The greatest number of them are either irregular hexagons, or irregular pentagons; but from the irregularity of some of them, it happens, that a pretty regular quadrangular column is sometimes formed. Those of the exterior row, are either quadrangular, or hexagonal, having one side external, two lateral, and either one or two internal. In the second row, they are mostly pentagons. Their coats are very thin, and seem transparent, closely connected with each other, having a kind of loose net-work of tendinous fibres, passing transversely and obliquely between the columns, and uniting them more firmly together. These are most observable, where the large trunks of the nerves pass. The columns are also attached by strong inelastic fibres, passing directly from the one to the other. The number of columns in different Torpedos of rather small size, appears to be about 470 in each organ, but the number varies according to the size of the fish; and in a very large Torpedo, the number of columns in one electric organ was 1182. They must therefore increase, not only in size, but in number, during the growth of the animal, new ones forming perhaps every year on the exterior edges, as they are the smallest. This process may be similar to the formation of new teeth in the human jaw, as it increases. Each column is divided by horizontal partitions, placed over each other at very small distances, and forming numerous insterstices, which appear to

contain a fluid. These partitions consist of a very thin membrane, considerably transparent. Their edges appear to be attached to one another, and the whole is attached by a fine cellular membrane, to the inside of the columns. They are not totally detached from one another; and I have found them adhering at different places, by blood vessels passing from one to another. The number of partitions contained in a column of one inch in length, of a Torpedo, which had been preserved in proof spirit, appeared, upon a careful examination, to be one hundred and fifty: and this number, in a given length of column, appears to be common to all sizes in the same state of humidity, for by drying they may be greatly altered; whence it appears probable, that the increase in the length of a column, during the growth of the animal, does not enlarge the distance between each partition in proportion to the growth; but that new partitions are formed, and added to the extremity of the column from the fascia. The partitions are very vascular; the arteries are branches from the veins of the gills, which convey the blood that has received the influence of respiration. They pass along with the nerves to the electric organ, and enter with them: then ramify, in every direction into innumerable small branches upon the sides of the columns, sending in from the circumference all around upon each partition small arteries, which ramify, and anastomose upon it; and passing also from one partition to another, anastomose with the vessels of the adjacent partitions. The veins of the electric organ, pass out close to the nerves, and run between the gills, to the auricle of the heart. The nerves inserted into each electric organ, arise by three very large trunks, from the first of these in its passage outwards, turns round a cartilage of the cranium, and sends a few branches to the first gill; and to the anterior part of the head, and then passes into the organ towards its anterior extremity. The

second trunk enters the gills between the first and second openings, and after furnishing it with small branches, passes into the organ near its middle. The third trunk, after leaving the skull, divides itself into two branches, which pass to the electric organ through the gills; one between the second and third openings, the other between the third and fourth, giving small branches to the gill itself. These nerves having entered the organs, ramify in every direction between the columns, and send in small branches upon each partition where they are lost. The magnitude, and number of the nerves bestowed on these organs, in proportion to their size, must on reflection, appear as extraordinary as the phænomena they afford. Nerves are given to parts either for sensation or action. If we except the more important senses of hearing, seeing, tasting, and smelling, which do not belong to the electric organs, there is no part, even of the most perfect animal, which, in proportion to its size, is so liberally supplied with nerves; nor do the nerves seem necessary for any sensation, which can be supposed to belong to the electric organs; and, with respect to action, there is no part of any animal with which I am acquainted, however strong and constant its natural actions may be, which has so great a proportion of nerves. If it be then probable, that those nerves are not necessary for the purposes of sensation or action, may we not conclude that they are subservient to the formation, collection, or management of the electric fluid? especially as it appears evident from Mr. Walsh's experiments, that the will of the animal does absolutely controul the electric powers of its body; which must depend on the energy of the nerves."

That the electric organs of the Torpedo are described with accuracy by Mr. Hunter, in the above paper, is pretty certain. The most

diligent naturalists among those who have since attended to the internal structure of the animal, having been unable to detect any omission of material consequence in that anatomical dissertation. The observations of Mr. Walsh and Mr. Hunter roused the curiosity of many. The Abbe Rozier entered at considerable length into its history, an account of which was published about two years after the joint papers of Mr. Walsh and Mr. Hunter appeared in the transactions of the Royal Society. Duhamel followed, and was equally assiduous in his investigations. And Spallanzani, beside some other ingenious observers, pursued the same enquiry. There is also a very copious dissertation on the electric properties of the Torpedo, with strictures on the observations of Mr. Walsh and Mr. Hunter, by Mr. Cavendish, in the sixty-sixth volume of the Philosophical Transactions. To the writings of these respective authors we must refer the reader, desirous of more ample information concerning the anatomy of those organs, as we shall ourselves take leave of the subject, after relating some few particulars that have fallen from the pen of Lacepede respecting them. Those observations are not important for their novelty, but still deserve mention. This naturalist, proceeding to describe those parts of the Torpedo in which the galvanic faculty resides, explains the structure of those organs in the following manner :—" De chaque côté du crâne et des branchies est, un organe particulier qui s'éntend communément depuis le bout du museau jusqu'à, ce cartilage demi-circulaire qui fait partie du diaphragme, et qui sépare la cavité de la poitrine de celle de l'abdomen. Cet orange aboutit d'ailleurs, par son côté extérieur, presque à l'orifice de la nageoire pectorale, et est plus épais dans son côté intérieur. Entre cet organe et la peau, on voit deux espèces de bandes superposées l'une à l'autre, dont la supérieure, à fibres longitudinales, s'unit avec la peau par le moyen d'un tissu cellulaire, et dont l'inférieure, à fibres

transversales, se continue dans l'organe par un très-grand nombre de prolongemens membraneux, qui y forment des prismes verticaux à cinq ou six pans, ou pour mieux dire des tubes dont la hauteur diminue à mesure qu'ils s'approchent du bord, et qui sont remplis d'une substance mollasse, transparente, qu'on a reconnu, par l'analyse, être composée d'albumine et de gélatine. On a compté dans chacun des deux organes d'une *Torpille*, jusqu'à près de douze cents de ces prismes, les un réguliers, les autres irreguliers, mais tous divisés, dans leur intérieur, en plusieurs intervalles, par des cloisons membraneuses, horizontales, transparentes. De plus, chaque organe est traversé par des artères, des veines, et des nerfs, qui courent dans toutes les directions, et qui y portent une vie active *."

" On ne peut se refuser à voir, dans ce double organe, une assemblage de piles galvaniques plus petites, mais aussi beaucoup plus nombreuses que celles qui ont été observées dans la *Gymnote Electrique* †. C'est donc encore le fluide galvanique qui agit ici, et non le fluide électrique ; mais les différences qui existent entr'eux sont trop légères pour qu'on doive changer les expressions employées ci-devant ‡."—" On peut donc encore dire, 1°, que toute l'électricité de la *Torpille* est renfermée, et produite par ses doubles organes, et que les autres parties de son corps ne servent que de conducteurs ; 2°, que l'effect des organes semble être dépendant et subordonné à sa volonté ; 3°, qu'on ignore si elle peut faire agir un organe independamment de l'autre ; 4°, qu'on ne reçoit aucune commotion

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* Vide also Journal de Physique de l'Abbé Rozier, 1775.

† Gymnotus Electricus, Electric Eel.

‡ Bosc. Nov. Dict. Nat.

lorsqu'on touche en même temps les deux organes en dessus ou dessous, mais qu'il y en a toujours, une lorsqu'on établit une communication entre le dos, et le ventre; 5o, que la peau et les nageoires servent de conducteurs, quoique plus foiblement que le fer."

The benumbing faculties of this animal, when exerted to the utmost, are neither so powerful, nor so terrible, as the ignorant in early times were taught to conceive. In the warmth of an invigorated imagination, their poets feigned that vessels in full sail might be arrested in their progress through the briny waves by its intervention only; and that the astonished fishermen were oftentimes struck motionless while hauling up their nets in which their lurking captive, the Torpedo, lay entangled. Oppian describes the power of its shock upon the angler in a similar manner.

> " The hook'd Torpedo, with instinctive force,
> Calls all his magic from its secret source:
> Quick through the slender line and polish'd wand
> It darts, and tingles in th' offending hand.
> The palsied fisherman, in dumb surprise,
> Feels through his frame the chilling vapours rise:
> Drops the lost rod, and seems, in stiffening pain,
> Some frost-fix'd wanderer on the polar plain."
>
> *Shaw's Trans.*

But although the exaggerations of the ancients are not to be retained, we are not entirely to reject their evidence. The history of the animal is now better known; the extent of its electric powers more fully ascertained; and yet the assertions of the ancients in some particulars deserve credit. Pliny tells us, that the Torpedo, when

touched with a spear or stick, can benumb the strongest arm, or stop the swiftest foot. That the Torpedo cannot be handled with impunity, when at first taken out of the water, we have the assurance of some old fishermen, who have several times caught it in their nets, when trawling upon the southern coast for flat fish. They insisted that its benumbing influence was felt with equal force, when touched with the boat hook, or the hand. Another circumstance related by Pliny, is verified by Mr. Walsh, who tells us, that when the Torpedo is accidentally left upon the shore by the ebbing tide, it buries itself in the sand, by briskly flapping the extremities, which falls upon the upper surface of the fish, and by that means conceals it from view. In this situation Mr. Walsh observes, the Torpedo is capable of giving its most violent shock, which is strong enough to throw down the passenger that inadvertently treads upon him. Spallanzani discovered in the course of his experiments, that not only the Torpedo in an infant state, but those yet unborn, when extracted from the womb of the pregnant female, are able to communicate the electric shock with a sensible degree of vigour. Some further experiments were tried on this animal, by Dr. John Ingenhouz, at Leghorn, in the year 1773, in company with Dr. Drummond, the particulars of which are inserted in the philosophical transactions. From the remarks of this gentleman we learn, that the Torpedo upon that coast lie on a muddy bottom, about twenty miles from the shore. He took an excursion to this spot for the express purpose of fishing for them, and caught five. Before the nets were taken up, he charged a coated jar by means of a glass tube, and gave a shock to some of the sailors, who all told him they felt exactly the same sensation when they touched the Torpedo. He further learnt, that this creature has very little force in the winter, and cannot live a long time out of the water. As soon as caught, he put the Torpedos,

with other fish, into a tub of water, the latter of which did not appear to be at all hurt by those associates *. On pressing his thumbs upon the upper side of the two soft bodies on each side the head, Dr. Ingenhouz, in about the space of a minute or two, felt a sudden trembling in the thumbs, which extended no further than the hands, and lasted about two seconds. Sometimes the shock was so strong as almost to oblige the hand to let go the fish, and at others was scarcely at all perceptible. The Torpedo being suspended by a clean and dry silk ribbon, attracted no light bodies, such as pith balls, or others put near it. A coated bottle applied to the fish thus suspended, did not at all become charged. When the fish gave the shock in the dark, he heard no cracking noise, nor could he perceive any sparks. When the fish was pinced with the nails, it did not give more, or fewer strokes than when not pinced. But by folding its body, or bending its right side to the left, the shocks were felt more frequently, and every circumstance tended to prove, that those shocks were perfectly voluntary.

Writers are by no means agreed as to the goodness of this fish, as an article for the table. Galen recommends it, because the flesh is easy of digestion, and salutary for persons in ill health, and he also tells us, that the living fish applied externally to the head, cures many disorders with which that part is sometimes affected. Dioscorides says, the rheumatism is cured by applying it externally. Rondelet does not allow the flesh to be wholesome, assuring us the Prefect of

* This appears to imply a contradiction to the experiments of M. Reaumur, who confined a live Torpedo in a bucket of sea-water with a duck for some hours, when the latter was found dead, as was concluded, from the reiterated shocks received from the Torpedo.

Health, forbids its being sold in the markets at Venice, though on the coast of France it is sometimes sold and eaten. Mr. Walsh caused one of a large size that was caught at Brixham, on the south coast of England, to be dressed and brought to table, but some friends suffered a little by their curiosity in tasting it. The electric organs, the latter observes, which make up one half of the fish, are mucilaginous, and unwholesome, but the rest is palatable as any of the Ray tribe. Dr. Bloch remarks, with much propriety, that the new experiments which have been made in our days upon the principles of electricity, clearly show, that a commotion of the same nature as that occasioned by the shocks of the Torpedo, might be successfully employed for the relief of some disorders, to which the human frame is incident. Among the Abyssinians, it is customary to administer the Torpedo for the cure of the fever, by applying it successively to all the members of the person affected. This operation is attended with cruel torture, but as a remedy, is deemed infallible. The same custom prevails also among the Ethiopians.

In point of colours of the upper surface of this fish, are observed to vary considerably, from a pale brown to a deep blackish purple. The five remarkable dusky spots, which are strongly characteristic of the mediterranean sort, is comparatively very pale in those found in the more northern parts of Europe, and in many are not at all perceivable. They feed on other fish, a surmullet, and a plaise, having been found by Mr. Walsh in the stomach of a Torpedo, on dissection. The generation of the Torpedo is described by Aristotle *, and the accuracy of this writer has been confirmed, by the

* Arist. Hist. anno lib. v. c. 5.

teſtimony of a late observer; notwithstanding Lorenzini is disposed to contest the veracity of this ancient philosopher. M. Saunier of La Rochelle, upon opening a very large Torpedo, on the 10th of September, discovered floating in the left matrice, nine fœtuses quite formed, near two inches long, and distinct from them nine eggs in a state of forwardness; and in the right matrice were four fœtuses, and nine eggs, in the same state as the former. Aristotle was therefore right in asserting that the Torpedo brings forth her young at the autumnal equinox.

The Torpedo is distinguished from all other species of the Ray tribe, by the perfect smoothness of the skin all over. Near the extremities a vast number of minute pores may be observed. The eyes are small: and the whole appearance of the fish is inelegant, if not disgusting.

MIRROR RAY.

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PLATE CIII.

RAJA MIRALETUS.

MIRROR RAY.

****** *PISCES CHONDROTTERYGII.*

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath near the neck: head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed: body thin, depressed, and rhombic.

SPECIFIC CHARACTER

AND

SYNONYMS.

Back and belly smooth; near the eyes aculeated, and a triple row of spines on the tail.

Raja Miraletus: dorso ventreque glabris, aculeis ad oculos, ternoque eorum ordine in cauda. *Linn. Mus. Ad. Fr.* 2. *p.* 50. *Art. Gen.* 72. *syn.* 101.—*Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. *p.* 1507. *sp.* 4.

Raja dorso dipterygio, aculeorum ordine solitario, cauda gracili pinnata, ordine aculeorum terno roſtro subaculeato, *Gron. Zooph.* 155.

Dasybatus in utroque dorsi latere mascula magna oculi. *Klein. miss. pisc.* 3. *p.* 35. *n.* 2.

Raja Oculata. *Jonst. pisc. t.* 10. *f.* 4.

Raja lævis oculata. *Will. Ichth.* 72. *Ray. Pisc. p.* 27.

PLATE CIII.

The specimen of this curious fish in our Museum was purchased in the London markets in the month of August, 1807. The size was that of a small Thornback, measuring about twenty-three inches from the tip of the nose to the extremity of the tail. The figure resembled the Homerling Ray, for, like that species, the whole of the upper surface was marked with roundish spots of brown upon a pale livid ground, and the tail armed with a triple series of prominent spines, those on each side being equal in point of magnitude with the others disposed along the middle. The ocellar spot in the centre of each wing was so very distinctly marked, that the fish appeared altogether a novelty, and at once struck us that it could be no other than the Raja Miraletus of Linnæus, a species described as a native of the Mediterranean, but not before noticed by any writer as an inhabitant of our seas. The pupil was formed by a large and very dark purple spot, encircled by a ring of shining silvery green, which inclined in some directions of light to blue, and was enclosed by a broad and dark boundary, composed of five equidistant contiguous spots of blackish purple; the whole resembling in some degree the eye of a peacock's feather.—The subject, as nearly as we could learn, was caught on the coast of Sussex.

Although we present this as the *Raja Miraletus* of Linnæus with perfect confidence, it is not without some hesitation at least, that we can offer it as a distinct species. In every respect, except the ocellar spot on the wings, it perfectly agrees with the Homerling Ray, and may possibly prove, on further examination of other specimens, to be only a *lusus*, or remarkable variety of that fish. We have certainly seen vast numbers of the Homerling without ever once observing any mark similar to this upon them, but the same character has occurred to our notice in another species of Ray, the com-

mon Skate.—Our suspicions of its not being a genuine species were first excited by perceiving among a number of the Skate of various sizes, several of the smaller ones marked exactly in the same manner. They were evidently Skate from their general figure, from the larger spines on the tail being disposed down the middle in a single series, and the uniform blackness of the lower surface, the dingy aspect of which is assumed from the innumerable small black specks with which the skin in that part is dotted. A large Skate afterwards occurred, in which the same annular mark was very observable; and from that time for some years past becoming more attentive to this circumstance, we have perceived it in the Skate more or less conspicuous in every stage of growth. This we believe has not been hitherto mentioned by writers; the fact is, however, certain, and clearly proves that those ocellated spots are not peculiar to Raja Miraletus, and consequently insufficient to prove it a species.—In every other respect, as before observed, it agrees with the Homerling, and upon the whole may prove, as already suggested, to be only a variety of that species. It is certainly a very remarkable and curious fish, whether it be a variety, or a species, and highly worthy of a place in the present work.

ROUGH RAY.

London Published as the Act directs by F. Jeffreys at R. F. R. Thurgood Duck Lane.

PLATE XX.

RAJA RUBUS.

ROUGH RAY.

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath, near the neck: head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed: body thin, depressed, and rhombic.

SPECIFIC CHARACTER

AND

SYNONYMS.

Back a single, tail with three rows of spines.

RAJA RUBUS: ordine aculeorum in dorso unico, tribusque in cauda *Block. Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. *p.* 1507. *sp.* 10.

La Ronce. *Block.*

Linnæus was either unacquainted with this fish; or perhaps mistook it, as Block observes, for a variety of the common Thornback. It has been since described by other writers, and lastly by Gmelin. This author is of opinion, that the Ray which Mr. Pennant found in Lock Broom, in the Shire of Ross, in Scotland, and which he

calls the Rough Ray, is of this species: an opinion, we think, not unlikely, although his description does not strictly agree with any of those specimens we have had an opportunity of noticing. In small subjects, the tuberculated and prickly appearance of the skin is less obvious, in proportion than in the larger ones; but the triple row of spines on the tail, and single one on the back, is sufficiently apparent in the smallest we have seen.

This species is sometimes brought to the London markets, and is known on the coasts of Pembrokeshire by the name of Sand Ray.

STING RAY.

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PLATE 115

PLATE XCIX.

RAJA PASTINACEA.

STING RAY.

*** *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath near the neck: head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed: body thin, depressed, and rhombic.

SPECIFIC CHARACTER

AND

SYNONYMS.

Tail finless, and armed with a serrated spine.

RAJA PASTINACEA: cauda apterygia, aculea sagittato. *Bloch. Fisch. Deutschl.* 3. *p.* 12. *n.* 4. *t.* 82.

RAJA PASTINACEA: corpore glabro, aculeo longo anterius serrato in cauda et dorso apterygio. *Linn. Mus. Ad. Fr.* 2. *p.* 51. *Arted. gen.* 71. *Syn.* 100. *Müll. prodr. Zool. dan. p.* 37. *n.* 310.—*Gmel. Syst. Nat. T.* 1. *p.* 3. 1509.

Raja cauda sagittata. *Baster. op. sub. sec.* 2. *p.* 33. *t.* 4. *f.* 5—10.

PASTINACA MARINA. *Jonst. pisc. p.* 32. *t.* 9. *f.* 7.

Pastinaca Marina nostra. *Aldr. pisc. p.* 426.

PLATE XCIX.

Gej. *Kaempf. Jap. p.* 155.
Fire Flaire. *Ray syn. pisc.* 24.
Sting Ray. *Penn. Brit. Zool.* 3. *p.* 71. *n.* 6.

The Common Sting Ray is known by having the tail destitute of any fin, and being armed with a strong serrated spine of a bony texture. The Raja Aquila has a similar spine on the tail, but the tail itself is furnished with a fin at the tip. There are also some others of the Ray tribe that are armed in like manner with spines, but differ in other respects specifically. Gmelin admits two varieties of our Raja Pastinacea, the *Altavela* of Willughby and Ray, having two dorsal spines serrated anteriorly, and the *Uarnak* of Forskall, the body of which is spotted.—As the Sting Ray sheds its spine annually, and the new spine appears before the old one drops off, we have suspected that the Altavela may be only the common kind, at that precise period when both spines appear; and with respect to the Uarnak or spotted kind, we believe this depends only on the age of the fish, all the smaller ones we have seen having been more or less variegated with spots when first caught, and even sometimes we have observed the same in those of the largest size. The general colour of the upper surface, when perfectly fresh, is a light brown, partaking of a testaceous hue, and tinged in parts with blueish; some time after death the whole becomes more dusky. The lower surface is white. Its length in general from two to three feet.

In point of figure the Sting Ray bears some resemblance to the Skate; like that fish its skin is perfectly smooth, but the body is of a more rotundate form in the contour, and exceeds it considerably in thickness. The flesh is rank and disagreeable, so much indeed that

it is seldom eaten, and the capture of it an object of consideration only for the sake of the oil which may be extracted from the liver. The fishery of the Sting Ray is also attended with some danger, the sting on the tail, from whence it derives its name, being capable of inflicting a most severe wound. This formidable weapon, which the animal employs with astonishing dexterity and force against its enemies, consists of a narrow flattened spine, four, five, or six inches in length, acutely pointed and barbed along the edges, with small incurvated teeth: this sting has the texture of bone, and is remarkable for its strength. The fishermen consider the sting as highly poisonous, conceiving that at the same time it lacerates the flesh, a most malignant and acrimonious fluid is instilled into the wound. Aldrovandus, Rondelitius, Linnæus, and various other writers, entertain the same opinion; Pennant, on the contrary, denies the fact: he observes, that "this weapon of offence is capable of giving a very bad wound, and which is attended with dangerous symptoms, when it falls on a tendinous part, or on a person in bad habit of body; but as to any fish having a spine charged with actual poison, (he adds,) he must deny his assent to it, though the report is sanctioned by the name of Linnæus." We entirely coincide with Pennant, that the spine of the Sting Ray is by no means charged with any actual poison, and that the danger resulting from the wound inflicted, depends solely upon the ordinary circumstances attendant on any other wound.

This fish is mentioned by Pliny, Aristotle, and various other writers of antiquity. The ancient poets feigned that the wound of its spine was attended with the most direful effects. *Circe*, the enchantress, is said to have armed her son with a spear pointed with its spine, as the most terrible weapon she could devise, and with which he afterwards unintentionally killed his father Ulysses. It is

not impossible that in the invention of those fables the ancients allude indiscriminately both to this Ray and the analogous species *Aquila*, which also inhabits the seas of the South of Europe, rather than to this species individually. Pliny describes both kinds, as does likewise Aristotle, but although the characters of the two fishes were well discriminated by those early Naturalists, it is more than probable the poets were less precise, as both fishes were known to be endowed with the same kind of offensive weapon.

THORNBACK.

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London Publ.d as the Act directs by E. Donovan, & F.& C. Rivington, May 1, 1803

PLATE 116

PLATE XXVI.

RAIA CLAVATA.

THORNBACK.

CHONDROPTERYGII.

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath, near the neck: head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed: body thin, depressed, and rhombic.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body spinous: teeth tuberculated: a strong cartilage across the abdomen.

Raia Clavata: aculeata, dentibus tuberculosis, cartilagine transversa abdominali. *Linn. Fn. Suec.* 293.— *Gmel. p.* 1510. *sp.* 8.

Raja dorso dipterygio aculeis scabro, cauda ordine aculeorum solitario, apice pinnato, rostro acuminato. *Gronov. mus.* 1. 140.

PLATE XXVI.

Raja ordine aculeorum unguiformium unico in dorso caudaque. *Bloch. Deutschl.* 3. 58.

Raja clavata. *Ray, Will. &c.*

THORNBACK. *Penn. Brit. Zool.* 3. *p.* 69. *n.* 5.

This common fish, according to Mr. Pennant, is easily distinguished from the other species of Ray, by the rows of strong sharp spines, disposed along the back and tail. The number of those rows are far from constant, and almost every author speak of them differently. In one of a large growth Mr. Pennant found three rows on the back and five on the tail: some mention but three rows on the latter; and others only one. The characters which *Artedi*, and after him Linnæus, have assigned this species, are not free from objection, for as M. Bloch very justly observes they are certainly too general: all the rays having the cartilage across the belly, and many the blunt or tuberculated teeth as in this species.

In respect of colour, it is well known this fish is apt to vary a little. Klein speaks of them having the upper surface marked with round whitish spots, and such as are brought to the London markets answer to this description: Mr. Pennant considers these whitish spots as a character of the young fish, but we have observed them more or less distinct on the largest as well as the smallest specimens that have occurred to our notice; and some of these have weighed twenty or thirty pounds each, if not more.

Like the Skate, the young of this kind are called *Maids*, and are of a better flavour than the old ones. Among naturalists it is gene-

rally believed, that this fish casts off and renews its large tuberculated spines every year, and that the places from which they have fallen may be easily perceived by the whitish marks that remain in the skin. When the ground colour of the back is a lightish ash, and the round whitish spots are each distinctly encircled with a ring of black, the upper surface of this common fish has a pretty ornamented appearance. The under side is pure white with only a few spines.

The Thornback is taken at most seasons, but in the greatest abundance in the spring and summer, because they approach the shores at those times in vast numbers to deposit their eggs among the weeds. The eggs of these fish bear a strong resemblance to those of the Shark tribe, having a quadrangular, black, and horny shell, but the corners do not terminate in long filaments as in those of the Shark. Like the other kinds of flat fish, the Thornback frequents sandy shores, and feeds on all kinds of small fish and worms, both of the naked and shelly tribes.

The amazing size to which these fish sometimes grow is almost incredible; a ray supposed to be of this species was captured near the island of St. Christopher's, in 1634, that measured twelve feet in length; and Gmelin informs us, that this species does sometimes grow to that size. On the coast of Norway they are taken in vast quantities: the flesh the natives eat, either fresh or salted, and from the liver extract an oil for burning in their lamps, or other domestic purposes. The flesh of the Thornback, is thought, in England, inferior to the Skate, and is not unfrequently sold for it, by the London fish-mongers.

STARRY RAY.

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London. Published as the Act directs by E. Donovan & T.E. Nº 4 Elvington Yorkshire Feb. 1st 1808.

PLATE 117

PLATE CXIV.

RAJA RADIATA.

STARRY RAY.

****** *PISCES CHONDROPTERIGII.*

GENERIC CHARACTER.

Spiracles ten, five on each side, oblique, and placed beneath, near the neck: head small, pointed, not distinct from the breast, with the mouth beneath, transverse, and toothed: body thin, depressed, and rhombic.

SPECIFIC CHARACTER.

Spines on the upper surface large and divergent into radiated processes at the base: a single series of large subconic spines down the back and tail.

RAJA RADIATA: supra aculeata: aculeis magnis basi divergentibus radiatis, dorso caudaque ordine unico aculeorum subconicorum.

This is a new species of Ray, and one the most singular of its tribe at present known. The figure in the annexed plate represents this fish in its natural size. It was caught on the north coast

of Britain, and obligingly communicated to us by Mr. Statchbury, of the Old Jewry, London.

As the individual specimen above mentioned is the only one of its kind that has occurred to our observation, we are unable to determine if this curious species ever attains to a larger size; though we should rather suspect it may. Whether, however, it be in the young or adult state, it is obviously of a species not hitherto described by any author, and is therefore to be regarded as an interesting addition to the Raja genus: and to the British *Fauna* in particular.

Should this fish grow to a large size it must become a powerful and formidable animal. The whole of the upper surface is aculeated, or beset with spines of a small size, interspersed with others which are much larger in proportion to the magnitude of the fish than is observeable in any other of the Ray tribe. The greater spines are of two kinds; those with a large subconic furrowed base, and such as are distinguished by their remarkable radiated processes, divergent at the base as from a common center, and assuming altogether a singular stellated appearance. Those with a conic base are disposed chiefly in a single series along the back and tail; and the others, which are radiated at the base, are scattered over the surface of the wings; the latter-mentioned spines are extremely curious, and appear to be entirely peculiar to this particular species.

MARINE, OR SPOTTED LAMPREY.

London. Publ.d as the Act directs by E. Donovan & F. & C. Rivington. April 1. 1803

PLATE LXXXI.

PETROMYZON MARINUS.

MARINE, OR SPOTTED LAMPREY.

* *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Head more slender than the body. Mouth longer above than beneath: teeth orange, hollow within, and surrounded by a fleshy margin. Spiracles seven on each side the neck. A fistulous aperture on the nape. Without pectoral, or ventral fins.

SPECIFIC CHARACTER AND SYNONYMS.

Mouth papillous within: second dorsal fin distinct from the tail.

PETROMYZON MARINUS: ore intus papilloso, pinna dorsali posteriore a cauda distincta. *Linn. Fn. Suec.* 292. *Gmel. Linn. Syst. Nat.* 1513. 129. *sp.* 1.

PETROMYZON MARINUS, ordinibus dentium pluribus. *Bloch Fisch. Deutschl.* 3. *p.* 38. *n.* 1. *t.* 87.

Petromyzon maculosus, ordinibus dentium circiter viginti. *Art. gen.* 64. *syn.* 90.

PLATE LXXXI.

Lampreda marina. *Gesn. paralip. p.* 22.
LAMPREY, or LAMPREY EEL. *Will. Ichth. p.* 105.
Raii Pisc. 35.
Pen. Brit. Zool. v. 3. *p.* 76. *sp.* 27.

The spotted Lamprey is a marine fish, ascending the larger rivers only early in the spring to spawn, and returning again to the sea after an absence of three or four months. It is a general inhabitant of all the northern seas of Europe; and is found in most of the principal continental rivers in March and April. The spotted Lamprey is apparently less abundant in the British than the north seas. We have some reason to believe, with Pennant, that it is more common in the vicinity of the Severn than in most other of our rivers, or perhaps with the exception of certain rivers in Scotland and Ireland. In the river Usk, a few miles from its junction with the Bristol channel, we know this fish to be occasionally taken of a large size, and in some plenty. A specimen of about two feet long, that was caught last spring at the entrance of the Thames, is now in our possession, but we cannot learn that it ever ascends this river to spawn.

Authors speak of the spotted Lamprey as a very prolific fish. The usual size is from eighteen inches to two feet, and sometimes three, which last it may be presumed very rarely to exceed. Bosc, a French writer of the present day, indeed asserts, that this fish grows to the enormous length of six or eight feet, and is then about four inches in diameter; but on what authority this assertion is advanced, is not mentioned. The strong adhesive power which

the mouth of this fish possesses is astonishing: it has been ascertained by experiment, that when once it has securely affixed itself by the mouth to a stone, or other heavy body, it will retain its hold for a considerable space of time, even when lifted up by the tail with the object twice or thrice its own weight suspended to it by this means. This tenacious property must afford the animal a powerful and almost invincible advantage in seizing upon its prey. Independently of this, it is a fish endowed with much strength, and remarkable for its activity both in the water, and on the shore, where it occasionally prowls in search of worms, and other objects of food. The colour of this species appears to vary materially at various seasons, and at different periods of growth: the specimen from which our figure is copied was of a bright green, tinged with blue, yellow, and reddish, and marbled in an elegant manner with black; and those colours, the green especially, prevailed so strongly as to be retained in the specimen after remaining some months in spirits. Other Lampreys have been seen of a blueish colour, spotted with black; olivaceous, with spots of a dusky hue; or pale and reddish, marbled with chesnut, instead of black.

The flesh of the Lamprey is esteemed delicious by many: those of a middle size are however most admired for the table, being of a milder flavour, and less fat than those of a large size. In early times this fish was held in high repute in this country as a luxurious article of food, constantly appearing at the splendid banquets of the great. The partiality of Henry I. King of England, to this favourite dish appears, upon the testimony of the best historians, to have been the occasion of his death. Mr. Pennant speaks of it as an ancient custom for the City of Gloucester annually to present his Majesty

with a Lamprey-pye, covered with a large raised crust; and further observes, as the gift is made at Christmas, it is with great difficulty the Corporation can procure any fresh Lampreys at that time, though they give a guinea a-piece for them so early in the season. The Lamprey potted is admired as a delicacy by our modern epicures. Bloch mentions another mode of curing this fish, as practised in some of the fishing towns in the north of Gennany, in the neighbourhood of which they take the Lamprey in the greatest plenty: the fishermen cut the fish into pieces, and, after broiling it, pack it in barrels, with a pickle of vinegar and spices *, and transport it as an article of trade to the interior of the Continent, where this fish is scarcely ever taken, or is entirely unknown. The Lamprey is in the highest season in the spring; the flesh becomes flabby in the summer, after it has remained long in the fresh waters, and is not then considered very wholesome.

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* Sometimes they pickle it in a liquor composed of vinegar, salt, and pepper, with an infusion of thyme, and a little bay-leaf, which will preserve the fish for months, if kept in a cold situation.

LAMPERN, OR LESSER LAMPREY.

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PLATE LIV.

PETROMYZON FLUVIATILIS.

LAMPERN, or LESSER LAMPREY.

****** *PISCES CHONDROPTERYGII.*

GENERIC CHARACTER.

Head more slender than the body. Mouth longer above than beneath: teeth orange, hollow within, and surrounded by a fleshy margin. Spiracles seven on each side the neck. A fistulous aperture on the nape. Without pectoral, and ventral fins.

SPECIFIC CHARACTER

AND

SYNONYMS.

Second dorsal fin angulated.

PETROMYZON FLUVIATILIS, pinna dorsali posteriore angulata. *Linn. Fn. Suec.* 290.—*Gmel. Syst. Nat.* 1. *p.* 3. 1514. *sp.* 2.

Petromyzon unico ordine denticulorum minimorum in limbo oris praeter inferiores majores. *Arted. gen.* 64. *syn.* 89. *sp.* 99.

PLATE LIV.

Petromyzon ordine dentium unico. *Bloch. Fisch. Deutschl.* 3. *p.* 41. *t.* 88. *f.* 1. 2.

Mustela. *Plin. lib.* 9. *c.* 19.

Lampreda. *Gesn. ic. anim. p.* 326.

Le Pétromyzon pricka. *Bosc. Hist. Nat.*—Petite Lamproie, or lamproie de rivière. *Buffon de Deterville, &c.*

Lesser Lamprey. *Penn. Brit. Zool. v.* 3. *p.* 60. *n.* 2.

The lesser Lamprey is specifically defined by the angulated structure of the second dorsal fin. Bloch thinks it is to be distinguished from the rest of the Petromyzon genus by the teeth; which, according to this writer, consist of a single series disposed in a circular manner within the mouth. His account is different from that of our countryman Mr. Pennant. The latter compares the form of the mouth to that of the sea lamprey. "On the upper part (he says) is a bifurcated tooth; on each side are three rows of very minute ones; on the lower part are seven teeth, the exterior of which on each side is the largest." To reconcile those authors is no task of difficulty. Mr. Pennant has taken into consideration the detached teeth in different parts of the mouth, while Bloch regarded only those which are conspicuous in the upper and lower series, and even those he does not speak of with his accustomed accuracy.

Since Dr. Bloch considers the disposition of those teeth as a specifical criterion of Petromyzon fluviatilis, it will not be thought improper to describe them minutely. In the anterior part of the mouth we observe a singular bony process, or tooth, of a size comparatively very large, which being curved and pointed at both extremities, re-

semble two remote teeth, and have been described as such by Bloch, in speaking of the anterior circle of them; but there is no incision or separation of any kind between them to constitute two teeth. On each side contiguous to this bony process, but still distinct, is a tooth with a double fang; the process in the center, and double tooth on each side, forming together the first principal series of the teeth. The next behind are two trifurcated teeth, not extending, like the preceding, entirely across the roof of the mouth, but only placed one on each side of it. The third, or posterior series, contain in the center seven distinct teeth rising from a single bony process, the exterior ones on each side from the central tooth becoming gradually larger and longer. At each end of this series is a small detached tooth with a double fang. Beside these, there are in the anterior part of the mouth, in front of the bifurcated process mentioned in the first series, five or six teeth of a middle size, disposed in an irregular manner. The outer border of the mouth has a number of other teeth that are very minute, but still perceptible to the touch when the finger is drawn over them.

The only species of this genus described by writers as inhabitants of this country, are marinus, fluviatilis, and branchialis. The kind we are now speaking of cannot readily be confounded with the two others. Marinus in a young state, is marked and spotted very distinctly: *fluviatilis*, it should be observed, is likewise found occasionally variegated with dusky marks more or less distinct, but it is uniformly distinguished by the connection between the second dorsal fin, and that of the tail, the second dorsal fin in *P. Murinus* being distinct. The species *branchialis* is known by the linear form of this fin, the annulated body, and the mouth being destitute of teeth, a circumstance, the latter, that has escaped the observation of Mr. Pennant.

PLATE LIV.

Petromyzon fluviatilis varies greatly in respect of colour. The belly is commonly silvery: the sides rather darker, and sometimes yellow, finely glossed with gold: the back dusky, blueish, blackish, or obscurely streaked; and the fins brown, sometimes violet, sometimes sanguineous. Lacepede describes several analogous species that are found in the rivers of France. One in particular that approaches very nearly to the young of this; and were it not for the rounded instead of angulated form of the dorsal fins, we might be inclined to think it rather a variety than a distinct species. The kind alluded to is called by Lacepede, *Petromyzon septœil*, and is described as being six or seven inches long, the colour greyish lead colour, and all the lower parts of a yellowish white. It is found in abundance in the Seine, and rivers flowing into that water.

The lesser Lamprey inhabits various parts of Europe, but is no where more frequent than in Prussia, and some of the states of the German empire, especially in Silesia, Pomerania, and the marsh of Brandenburgh. The rivers of France produce it likewise, although in less abundance. According to Gmelin, it is found in the lakes of Japan, and South America, as well as those of Europe. In England this fish is more abundant in the Thames, than any other river. Mr. Pennant speaks of this sort being caught in vast quantities, by the fishermen in the vicinity of Mortlake, to be sold to the Dutch as bait for their cod and turbot fisheries *. The larger ones are

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" Above 450,000 have been sold in a season for forty shillings per thousand Of late, about 100,000 have been sent to Harwich for the same purpose. It is said the Dutch have the secret of preserving them till the Turbet fishery." *Penn. Brit. Zool.* If we are not misinformed, these are taken much less abundantly, than in the time of Mr. Pennant. The demand for them has declined some years.

sometimes potted with the great Sea Lamprey, and being of a much milder flavour are in more esteem. Commonly, they are eaten stewed like eels. Broiled or fried they are rather tough, and of no very pleasant flavour. They bear a low price, and are remarkable for having no vertebral bone.

This fish is prepared for table in another manner, in some part of the German empire; after broiling them, and placing them in layers with bay-leaves, spices, and vinegar, they are packed up in barrels, and sent to different parts of the country. Bloch, who informs us of this particular, acquaints us further, that they are only esteemed good in the winter; during the summer, he says they are not wholesome. It is at this season of the year, they are afflicted with a disease that breaks out in little excrescences, which the fishermen call *rwude*. They conceal themselves at such times among the stones at the bottom of the water, or retire to the sea, from whence they migrate into the rivers again in the month of January. Their spawning season is in March and April, when they deposit a vast number of eggs, among the stones on the banks of rivers, where many of them are eagerly devoured by other fishes.

This creature is extremely tenacious of life, existing many hours after it is taken from its native element. On the borders of the river Bausker in Courland, where they are taken of a larger size than elsewhere, they are captured in great numbers under the ice in the winter, and being packed in snow are conveyed alive to very remote parts of the empire. When the Lampreys conveyed in this manner are unpacked at the close of their journey, they appear torpid, but upon being immersed in cold water, soon recover their activity.

PLATE LIV.

Through the fistulous opening on the head, this fish spouts out the water in the same manner as the animals of the cetaceous tribe.

TROUT.

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London. Pub.d as the Act directs by E. Donovan & F.& C. & J. Rivington. Feb.y 1.1806.

PLATE LXXXV.

SALMO FARIO.

TROUT.

*** *PISCES ABDOMINALES.*

GENERIC CHARACTER.

Head smooth, and compressed. Mouth large: lips small: tongue white, cartilaginous, and moveable: teeth in the jaws, and upon the tongue. Eyes moderate, and lateral. Branchiostegous membrane with from four to twelve rays; gill-cover of three plates. Body long, covered with rounded and very finely striated scales: back convex: lateral line straight, and nearest to the back: posterior dorsal fin fleshy without rays: ventral fin of many rays.

SPECIFIC CHARACTER

AND

SYNONYMS.

Body spotted with red: lower jaw rather longest.

SALMO FARIO: maculis rubris maxilla inferiore sublongiore. *Art. gen.* 12. *syn.* 23. *sp.* 51.

SALMO FARIO. *Linn. Fn. Suec.* 348. *Gmel. Linn. Syst. Nat. T.* 1. *p.* 3. 1367. *n.* 4.

Salmo ocellis rubris iridibus lucidioribus, pinna anali radices 11. *Bloch. Fisch. Deutschl.* 1. *p.* 148. *n.* 3. *t.* 22.

TROUT. *Will. Ichth.* 199.---*Raii syn. pisc.* 65.---*Penn. Brit. Zool. v.* 3. *p.* 297. *sp.* 146.

PLATE LXXXV.

The Trout is one of the most beautiful of the fresh water tribe of fishes. It is a native of Europe and Siberia, inhabiting rivers that communicate with the sea, the waters of which are pure and cold, with a pebbly, or rocky bottom, and is therefore found in the greatest numbers as well as perfection in the rapid streams among mountains. The Trout is found in most other clear waters, and is the principal inhabitant of lakes in alpine situations throughout Europe.

Like the salmon, the Trout swims with much velocity. The activity and strength of this fish is astonishing: at the commencement of the spawning-season it rushes up rivers difficult of access in defiance of numberless obstacles, in search of the most retired places to deposit its spawn, and in its progress will leap over stones or other impediments in the course of the river to the height of four or five feet. The food of the Trout consists of small fishes, testaceous animals, and flies which they catch by leaping out of the water, such as the Ephemeræ, and Phryganeæ, which hover near the surface. The spawning season is from September to October or later: the eggs are about the size of a pea, and of a bright orange colour.

This fish is subject to many varieties, differing in appearance according to the nature of the waters it inhabits, or the seasons of the year. In general when small, or of a moderate size, they are yellowish, or olivaceous, with a dusky back, the belly white and silvery, and the sides and back marked with a greater or less number of distinct red spots encircled with white, or blueish. The varieties spoken of by writers with regard to their form, colour, and dimensions are numerous, some of which may probably on further investigation prove to be distinct species, rather than varieties. The variety taken accord-

ing to Mr. Pennant in *Llyndivi**, a lake in South Wales, and called *Coch y dail*, is marked with red and black spots as big as sixpences: Trout with spots conspicuously large, but not so considerable as those, we have taken in plenty in the Dee river, Merionethshire. In the Eynion, a river not far from Machynlleth in the latter county, and also in one of the Snowdonian lakes, according to the Hon. Daines Barrington, are found a variety of the Trout which is naturally deformed, having a crookedness in the tail, more decidedly characterised than in the common Perch †. The Trouts of certain lakes in Ireland, such as those in the province of Gallaway, known by the name of the Gillaroo Trout, are remarkable for the great thickness of their stomachs, though do not differ in other respects from the common Trout‡. There are certain Trouts in the lakes of Scotland that are spotted very differently from the common sort, those we shall not enumerate among the varieties of the common Trout, as we suspect they may be of a distinct species.

With regard to size, the Trout varies greatly: its ordinary length is about twelve inches. Old Walton records the Fordidge Trout

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* *Llyn Teivi?*

† *Phil. Trans. vol. 64. p. 116. 310.*

‡ Mr. Pennant had an opportunity of comparing one of the Gillaroo Trouts, with a large one from the Uxbridge river; the last was, if he recollects, smaller and out of season, and its stomach, notwithstanding it was very thick, was much inferior in strength to that of the former; but on the whole there was not the least specific difference between the two subjects. *Penn. Brit. Zool.* The thickness of the stomach of this fish proceeds, no doubt as Pennant imagines, from the superior quantity of shell fish which it finds in the waters it inhabits, and which may call more frequently for the use of its commuting powers than is requisite in Trouts.

as one of the largest kinds: this, he tells us, bears the name of a town in Kent, near Canterbury, where it is usually caught: many of those Trout, he observes, are nearly as large as the Salmon, but are known by the difference of their colour; and the flesh, in their best season, cuts very white: these, Walton supposed, lived alternately nine months in the sea, and three in the river. The Trouts of Ireland called by the natives Buddaghs, are found of a large size in Lough Neagh, some of which have been known to weigh thirty pounds. Trouts are also taken in Hulse Water, a lake in Cumberland, which are reported to be of a size superior to those *. In the reign of Charles the second, a Trout was taken in the river Kennet, near Newberry, with a casting net, that measured forty-five inches †. One of the largest we have seen was caught in a stream contiguous to the Thames, near Hampton, Surrey, about three years ago. This gigantic creature measured thirty nine inches from the tip of the nose to the end of the tail: the jaws of this overgrown fish were more elongated than usual in the Trout, and both those and the tongue were armed with strong incurvated teeth, of a white colour, tinged with pale violet; and as in the Salmon, when out of season, the tip of the lower jaw turned up, and was received when the mouth closed, between the two fore teeth in the upper jaw. The colour was subolivaceous on the back, tinged with fine golden yellow; on the sides were several broad spaces of a lighter colour, marked with a cluster of scarlet spots; and the back was spotted with orange. The whole of the lower surface was of a pale Salmon colour; the fins yellowish, with the rays pale pink at the extremity, and at the base orange colour; the pectoral fin and tip of the dorsal fin, and tail dusky; the two latter

* It is said those are sometimes found so large as to weigh thirty pounds.

† Sir J. Hawkins note on Walton *Compl. Angl.* p. 122.

spotted with dirty orange. This enormous fish is the subject represented in the annexed plate, and which it was conceived would be deemed more interesting than one of the ordinary kind. Another individual of the common Trout, little inferior to this, was formerly preserved in the Edinburgh Museum, the colours of which agreed with this, except in being generally darker; the figure and disposition of the spots are the same; this was caught in a small rivulet near Edinbugh, and is now in our possession. Besides those, we have seen a third Trout of large size, in which the spots were deeper red than in either of the former.—The Trouts of the lake of Geneva have been long celebrated for their vast size. Gesner relates that Trouts three cubits in length have been taken in that lake.

The flesh of this fish is in high repute for the excellence of its flavour. It is has been remarked that the Trout is fat when other fish are thin, and meagre on the contrary, when others are fat, so that in the winter the flesh is white and of a bad flavour, and in the summer red, and good. We may add that this difference in the colour of the flesh does not depend on the seasons, having ourselves seen Trout both of the red, and white kind, taken at the same season in two contiguous streams in Cardiganshire, one of which invariably produces the red, and the other the white Trout. Walton says, the Trout comes in and goes out of season with the stag and buck, and are in high perfection in May.

Ausonius, who lived in the beginning of the fifth century, seems to be considered the first of the ancient writers who has noticed the Trout; he celebrates it for its beauty without adverting to the deliciousness of its flesh. Authors of later times speak of it with the highest commendation as an article of food, excepting those of a

large size, which are generally moist, or coarse, and of an ill flavour. The Trout varies in excellence, according to the qualities of the waters they inhabit, and the nature of their food: one sort, which is found at the source of the Orbe, in the Canton of Berne, is celebrated for the delicious flavour it acquires from subsisting chiefly on Crabs, and other crustaceous animals;—those of the purest mountain streams are also preferred to such as are found in swampy places in the low lands, or in still waters. The fisheries of the Trout are under the cognizance of the laws in most countries; in England, the Trout is regarded as private property, and protected by penal statutes. In Germany the laws are very severe, those who take the Trout unlawfully being punished with imprisonment, and in some of the provinces even with the loss of a hand. In the kingdom of Congo, where, according to Bloch, the Trout is also found, the like offence is punishable with death.

The first dorsal fin in the common Trout usually contains about eleven rays; pectoral fin thirteen; ventral fin nine; anal fin nine; and tail twenty-five.